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A LABORATORY GUIDE

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MATERIA MEDICA and PHARMACY

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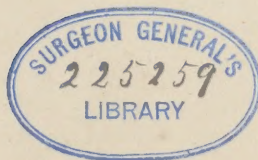
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PREFACE

This book represents in printed form, notes which have been used for several years in teaching Pharmacy and Materia Medica to Veterinary students.

Since Veterinarians prepare and dispense a great many of their medicines, pharmacy is quite an important subject to them. It has seemed desirable to include discussions of the different great pharmaceutical groups followed by the actual preparation of one or more examples of each group. The author believes that instruction in this subject can be better carried on in the laboratory than in the class room.

The subject of Materia Medica is difficult to present more on account of deciding what to exclude than what to include. It is granted that there are many things in Materia Medica impossible and useless to memorize. On the other hand, students should have an opportunity to examine and become more or less familiar with the synonyms, origin and physical characteristics of the most used drugs, and laboratory work is believed to be the best means of learning these things.

The grouping of the drugs for studying Materia Medica is arranged to correspond with the work in Pharmacology but otherwise is purely arbitrary.

Finally the author desires little claim of originality for the contents of the book. He has drawn freely from other most excellent books on the subjects, such as Sollmann, A Text Book of Pharmacology; Arny, Practice of Pharmacy; Edmunds and Cushny; Laboratory Guide in Experimental Pharmacology. He would recommend these books to any who care for more extended information on the subjects.

H. J. M.

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LABORATORY GUIDE TO MATERIA MEDICA AND PHARMACY

GENERAL DIRECTIONS

The work in this course will consist of the examination of specimens, testing drugs and their more common incompatibilities, dispensing medicines, manufacturing pharmaceutical preparations, taking notes, occasional demonstrations and weekly quizzes.

In making tests use as small an amount of the drugs as is necessary unless otherwise directed as to quantity. Follow directions carefully and use the amounts specified.

In case of specimens presented for examination note the form, color, taste (except poisons), weight, solubility and reaction.

Form.—Liquid or solid, crystalline or amorphous, deliquescent or effervescent.

Color.—Light, dark, clear, cloudy.

Odor.—Pleasant, aromatic, disagreeable, penetrating, etc.

Taste.—Acid, salt, sweet, acrid, aromatic, pleasant, etc.

Weight.—Comparatively heavy or light.

Solubility.—Use a small amount of the substance in a test-tube and from ten to fifteen times its bulk of distilled water and shake thoroughly. If insoluble heat to the boiling point. Proceed the same with alcohol, acid, alkali, chloroform or ether.

CAUTION.—Care, not to ignite the inflammable liquids.

Reaction.—Dissolve a small amount of the substance in a little distilled water in a test-tube, heat gently and test the reaction with red or blue litmus paper.

In the case of solutions, the darker should be added to the lighter, and the lighter to the heavier, at first only a few drops. Note any change that takes place before shaking. If there is no apparent result, shake the tube. If a precipitate forms, note whether it increases in amount or redissolves as more of the liquid is added. Note also, as far as possible, whether the results are due to physical or chemical changes.

CHAPTER I.

PHARMACY

Pharmacy is the science and art of preparing, compounding and dispensing drugs. The objects of pharmacy are so obvious that they need not be pointed out in this place. In order to have uniformity in the preparations obtained from the different shops, practically all civilized countries have standards, established by law, to which the drugs and their preparations must conform.

PHARMACOPOEIA. The books in which these standards are given are usually called pharmacopoeias. The first pharmacopoeia of the United States was published in 1820 and is revised every ten years by a committee of physicians and pharmacists. The preparations made according to this book are called official. The present Ninth Decennial revision appeared in August and became official in September 1916. The pharmacopoeia gives, first, the Latin title of the drug, followed by the English name, official abbreviation and synonyms. A short concise definition of the drug is given. This is followed by the characteristics and tests by which the identity and purity of the drug may be recognized and finally in what doses (human) it may be administered.

Since the pharmacopoeia is intended as a concise standard work of reference, it does not include all the material used in medicine nor does it go into detail concerning the drugs treated. Consequently in various countries other books have come into use, namely, dispensatories.

DISPENSATORIES are commentaries on the pharmacopoeia. They contain all that the pharmacopoeia states regarding official drugs and much added information. They also treat of other drugs not mentioned in the pharmacopoeia. There are three in the U. S.:—The National, United States and King's dispensatories.

In addition to the above books, there is the National Formulary, which contains formulae not included in the pharmacopoeia, but of sufficient importance to render standardization desirable. It is published by the American Pharmaceutical Association. Preparations made according to this book are generally designated as, *N. F.*

CHAPTER II.

METROLOGY—WEIGHTS AND MEASURES

Metrology is the science of weights and measures.

Weight is the sum of the attraction of gravity existing between the earth and a body upon its surface, and in weighing we simply balance a substance against another known force.

There are several standards of weights used in the United States, with which the physician, veterinarian and pharmacist must become familiar. Those most used are the Troy or Apothecaries' weights and the Wine or Apothecaries' measures, besides which are the Avoirdupois weights, and Metric weights and measures.

TABLE OF AVOIRDUPOIS WEIGHTS

437.5 grains (gr.)	=	1 ounce (oz.)
16 oz.	=	1 pound (lb.)=(7000 gr.)
100 lbs.	=	1 hundredweight (cwt.)
20 cwt.	=	1 ton

This table is never used in prescribing but is the one used almost exclusively in buying and selling all solid and many liquid drugs. When we purchase a "pound" we get an Avoirdupois pound, or 7000 grains. If we order an "oz.," we receive an Avoirdupois ounce or 437.5 grains as oz. stands for Avoirdupois ounce only. Many powerful drugs, like strychnine, morphine, etc., are usually handled in 1/8 oz. bottles, but these do not contain 1/8 of an Apothecaries' ounce or 60 grains, but 1/8 of an Avoirdupois ounce or about 54.7 grains.

TABLE OF APOTHECARIES' OR TROY WEIGHTS

20 grains (gr.)	=	1 scruple (℥)
3 scruples	=	1 drachm (ʒ) = 60 gr.
8 drachms	=	1 ounce (℥) = 480 gr.
12 ounces	=	1 pound (lb) = 5760 gr.

The grain used in this system is the same as that of the Avoirdupois, but the ounces contain 480 grains against 437.5 of the Avoirdupois, while the pound, lb. contains 12 ounces of 480 grains, or 5760 grains instead of the Avoirdupois pound of 16 ounces of 437.5 each or 7000 grains.

Of this table only the grains, drachms and ounces should be used in prescription writing. The scruple was used at one time but is largely in disuse at the present time and is unnecessary. Furthermore the character is not easily made, and if made carelessly or blurred may be mistaken for the drachm sign.

TABLE OF APOTHECARIES' (OR WINE) MEASURE

60 Minims (℥)	= 1 fluid drachm (f.℥)	
8 Fluidrachms	= 1 fluidounce (f.℥)	480 ms.
16 Fluidounces	= 1 pint (O.)	7680 ms.
8 pints	= 1 gallon (Cong.)	61440 ms.

To avoid confusion in the use of the Apothecary and Avoirdupois systems, the symbols, ℥, ℥̄, ℥̄, and ℥̄ should be consistently used for the apothecary and the abbreviations, lb., oz., gr., for the Avoirdupois. The abbreviation for the Troy pound is characterized by the cross line drawn through the letters, ℥., and should always mean 12 ounces, while the Avoirdupois pound stands for sixteen ounces. The symbol ℥̄ means an Apothecaries' ounce of 480 grains, while the abbreviation means an Avoirdupois ounce of 437.5 grains. The grain weight is the same for both systems and therefore, the abbreviation gr. will cause no confusion. The grain is, therefore, the unit for both systems and the term is derived from the old system of weighing, which required that there should be used a grain of wheat, well dried and from the middle of the ear. (head).

The character f℥ represents 60 minims, and f℥̄ is necessary to represent 480 minims.

A minim of water weighs about one grain (0.95 gr.) but it should be remembered that a minim is not the equivalent of a grain. 480 minims (1 f℥̄) of water weighed at the standard temperature of 25°C. (77°F.) weighed 454.6 grains. The specific gravity of liquids also varies so that a pint of liquid is not necessarily a pound. In writing the apothecaries' weights and measures in prescriptions, the figures are written in the Roman system and placed after the symbol, as gr..XX not 20 grs. In printed matter the small letters are used, but in writing it is better to use the capital L, because the small letter might easily be mistaken for an i. The ones should always be dotted and the last one may be written like a j; thus ℥̄ iij. The fl. before the sign ℥̄ or ℥̄ is often omitted, but under

no circumstances should the others be dotted, because in a hastily written or blurred prescription the pharmacist often depends upon the dots to differentiate an indistinct i from an l or a comma or period, or from an imperfectly formed v. Fractions are written as common fractions: gr. 1/10, not gr. 0.1.

TABLE OF APPROXIMATE OR POPULAR MEASURES

The popular measures are those usually found in the household. They are very inexact, and should be replaced with measuring glasses or some other means of measure. A common method in veterinary medicine is to use homeopathic vials of certain capacities, or syringes of known capacity. If spoons are used they should be filled so that the fluid stands level with the rim.

The most common of these measures are:

1 drop (gtt)	= 1 minim
1 teaspoonfull	= 1 f3
1 desertspoonful	= 2 f3
1 tablespoonful	= 4 f3 ($\frac{1}{2}$ 5)
1 wineglassful	= 2 f5
1 teacupful	= 4 f5
1 glassful	= 8 f5

It should be kept in mind that these equivalents are only approximate. A drop is not a minim and varies greatly with the character of the fluid, and of the container from which dropped; there may be from 44 drops of syrup of acacia, to 250 drops of chloroform to the drachm. Teaspoons vary from 1/2 to 2 drachms, dessert spoons vary so greatly that they should not be used. Tablespoons, wineglasses and tumblers also vary.

It is usual in figuring prescriptions to figure from 6 to 8 teaspoonfuls to the ounce, a tablespoonful as one-half ounce and in writing these prescriptions these factors should always be taken into account so that the druggist will be able to use a bottle which will just hold the amount desired. Their bottles are 1/2 ounce, 1 ounce, two, three, four, six, eight and sixteen ounces.

METRIC SYSTEM

This is based upon the decimal system. The unit of measure of distance of the metric system is the meter (M). (39.37 inches).



The meter is divided into 10, 100 and 1000 parts, called respectively, decimeter, dm.; centimeter, cm.; and millimeter, mm.

The unit of measure of capacity is the liter, l. It is equal to the contents of a cube whose edges measure a decimeter and the thousandth part of this is a milliliter (mil) formerly called a cubic centimeter (c.cm. or c.c.). The unit of weight is the Gramme (frequently written gram) which is the weight of one milliliter of water at 4° Centigrade (39.2°F.)

Greater or less quantities are designated by adding prefixes to the above.

TABLE OF METRIC WEIGHTS

1 milligram	=	0.001
10 milligrams	= 1 centigram (cg.)	0.01
10 centigrams	= 1 decigram (dg.)	0.1
10 decigrams	= 1 gram (gm.)	1.
10 grams	= 1 Dekagram (Dg.)	10.
10 Dekagrams	= 1 Hectogram (Hg.)	100.
10 Hectograms	= 1 Kilogram (Kg.)	1000.

TABLE OF METRIC MEASURES

1 milliliter (mil)	=	0.001
10 milliliters (mils)	= 1 Centiliter (cl.)	0.01
10 centiliters	= 1 deciliter (dl.)	0.1
10 deciliters	= 1 Liter (L.)	1.
10 Liters	= 1 Dekaliter (DL.)	10.
10 Dekaliters	= 1 Hectoliter (HL.)	100.
10 Hectoliters	= 1 Kiloliter (KL.)	1000.

In the above tables of weights and measures, the kilogramme is used in commerce and is referred to as a Kilo. The gram, fractions of a gram and milligrams are used. In the measures of quantity the Liter and milliliter and fractions of them are used.

In prescription writing only two units, grams and milliliters are used, abbreviated Gm. and mil. In expressing the quantity of drug in a prescription in the metric system, the quantity is always denoted by the Arabic figure placed before the appellation. Fractional parts are always converted into decimal fractions. It is not necessary to write grams, or milliliters or their abbreviations in a prescription because it is understood that the former will be used as the unit of weight and the latter for the unit of measure.

Table of Approximately equivalent Weights and Measures.

1 milligram (mil)	0.001	=	1/64 grain
1 centigram	0.01	=	1/6 grain
1 decigram	0.1	=	1 1/2 grains
1 gram	1.	=	15 1/2 (15.432) grains
4 grams	(3.9)	=	1 drachm
31 grams	(31.1)	=	1 ounce
500 grams	(453.6)	=	1 pound (av.)
1 Kilogram		=	2.2 pounds (av.) (2.2946)
1/64 grain		=	.001 gram
1/6 grain		=	.01 gram
1 grain		=	0.065 gram
15 1/2 (15.432) grains		=	1. gram
1 drachm (apoth.)		=	4. (3.9) grams
1 ounce (apoth.)		=	31.1 grams
1 minim		=	0.61 mil
16 minims (16.23)		=	1. mil
1 fluidrachm		=	3.75 mls
1 fluidounce		=	30. (29.572) mls
1 pint		=	500. (.4731 L. or 473 mls)

The following table of approximate equivalents should be memorized:

1 mil.	
1 gram	= 15-16 minims or grains
4 mls.	
4 grams	= 1 fluidrachm or drachm
30 mls	
30 grams	= 1 fluidounce or ounce.
500 mls	
500 grams	= 1 pint or pound
1 Liter	= 1 quart
1 Kgm.	= 2.2 lbs.

To convert grains into centigrams, multiply by 6.5. Thus 3 grains multiplied by 6.5 equals 19.5 centigrams, or 10 grains equal 65 centigrams or .65 grams. To convert centigrams into grains, divide by 6.5. Thus 26 centigrams divided by 6.5 equals 4 grains.

WEIGHING

In weighing a body we simply balance the force it exerts by its gravity against another known force. There are several types of balances or scales, spring, equal arm, unequal arm, and torsion.

The first is not very exact but is handy for coarse weighing. In weighing small amounts delicate instruments should be used. A few simple rules should always be followed.

1. Balance pans before starting weighing.

2. Drugs should not be placed directly on scale pans. These should first be covered with pieces of paper. The opposite pan should be balanced by a piece of paper of equal weight. Unless the pans are equally balanced in this manner, serious mistakes may occur in weighing small amounts. The object of the paper on the pans is two fold. It keeps the pan clean and insures freedom from contamination from some previously weighed drug.

3. Balance accurately with material to be weighed. When a pointer is provided on the balance, it should swing an equal distance each side of the center or zero.

Always throw balance off center when through weighing. This stops the movements of the balance and consequently stops its wear.

5. In weighing liquids, tare (weigh) or balance the container first.

MEASURING

This is done in graduated vessels (graduates) graduated or measuring flasks and pipettes. The wider the vessel at the place of reading the greater is the liability to error. On this account greater accuracy can be obtained if the vessel is as narrow as possible where the reading is taken. The minim graduate is not accurate for measuring small amounts, as a considerable amount of the measured liquid is retained in the vessel by capillarity. A minim pipette is to be preferred for this purpose and also for the fact that there is less error in pouring more or less than the required amount into the graduate.

The cylindrical graduate has the advantage that equal accuracy can be obtained throughout while the conical shaped graduate has the advantage of greater accuracy for small amounts. A few rules for measuring should always be followed.

1. Hold the graduate so that the top of the liquid is a horizontal plane perpendicular to the long axis of the graduate and have the top of the liquid on a level with the eye.

2. On account of capillarity, the surface is always cupped, forming a meniscus. The reading should always be taken at the *lowest level* of the meniscus.

CHAPTER III.

SOURCE AND COMPOSITION OF DRUGS

Drugs are obtained from both *organic* and *inorganic* substances. The vegetable and biological preparations are obtained from the former, while the various metals and their salts, the composition of which is shown by their name and chemical formula, are obtained from the inorganic. The greater number, probably are derived from the vegetable kingdom or from plants. All the different parts of a plant may be used in medicine but the active principle to which their action is due is usually found more abundantly in certain parts than others. In such cases the part or parts containing the largest amounts are used. The active principle may however, be quite evenly diffused throughout, in which case the entire plant may be used.

GROSS ANATOMY OF PLANTS

UNDERGROUND PORTIONS: These include the *root*, *rhizome*, *tuber*, *bulb* and *corm*. The root is that portion usually without chlorophyll and which does not have power to produce leaves. They sometimes possess a bark which is used separately, (*Sassafras*). Rhizomes are the underground portions capable of producing leaves, (*Hydrastis*). A tuber is a portion of the root greatly thickened which serves for the accumulation of reserve food materials (*Aconite*). A bulb is an increase in size of the root leaves, (onion, squill); while a corm is the thickened lowest part of the stem (*Colchicum*).

PORTIONS ABOVE GROUND: If the entire plant above ground is used, it is termed *herb* (*herba* or *species*) and consists of the leaves, stems, and sometimes of the flowers and fruit.

STEM. In herby plants it is termed *stipes*, in larger it is transformed into *wood* (*lignum*) and covered with a *bark* (*Cortex*). The *leaves* (*folia*) consists of a leaf stem (*petiolus*) and blade (*lamina*). There are also the *flowers* (*flores*), and *fruit* (*fructus*) or

seed (semenis). Besides the above, certain drugs consist of the *juices* of plants and are without definite structure (*opium, aloes*)

CHEMISTRY OF PLANTS

The chief elements found in plants are Carbon, Hydrogen, Oxygen and Nitrogen. These elements usually occur in combinations as fats, carbohydrates, tannins, resins, alkaloids, glucosides, acids, terpenes, etc., together with inorganic salts.

CHAPTER IV.

PLANT CONSTITUENTS

ALKALOIDS. Many of the most important and active plant constituents are alkaloids. They exist in almost all parts of a plant but are in largest proportions in the seeds and roots. They represent, in the greater number of cases, the active principle of the plant from which obtained and many of them are classed with the most powerful poisons.

They may be defined as *natural nitrogenous organic bases forming salts with acids*, i. e., they are *organic substances containing nitrogen, of basic character, uniting with acids without the elimination of hydrogen, forming well defined and usually crystalline salts*. The alkaloidal salts of the halogens are called *hydrobromides, hydrochlorides*, etc., and not the *bromides, chlorides*, etc. They contain nitrogen, carbon, hydrogen and most of them oxygen. Those containing oxygen are solids and comparatively nonvolatile, (cocaine) while those which do not contain oxygen are liquid and volatile (nicotine).

All alkaloids have certain common characteristics. Bitter taste, alkaline reaction to litmus, strong physiological action, and leave no post-mortem changes. The alkaloids differ from their salts in solubility. The former being freely soluble in chloroform, ether, and oils, less so in alcohol and almost insoluble in water, while the latter behave almost exactly opposite, being soluble in water and alcohol and almost insoluble in chloroform, ether and oils.

Experiments:—Solubility of alkaloids and their salts.

1. Test solubility of quinine and quinine sulphate (alkaloidal salt) in water, alcohol, ether and chloroform.

2. Add 0.2 gm. quinine to 100 mls of water in a flask. Shake flask. Note that only a small amount is dissolved, if any. Why? Test reaction with litmus and explain results. To above mixture add 1 mil of dilute sulphuric acid. Results. Why?

Use above solution for the following experiments: .

3. To 5 mls of the above solution in a test tube slowly add a solution of potassium carbonate until alkaline. Results. Why? Acidify with dilute sulphuric acid. Results. Why?

Explanatory:—Alkaloidal salts are feeble bases and are thrown out of solution by the addition of fixed alkalies and their carbonates which unite with the acid of the alkaloidal salt. The above precipitate was, therefore, the freed alkaloid which is insoluble in water. By the addition of the acid the soluble sulphate or bisulphate was again formed.

4. To 5 mls of solution from No. 2 add a solution of potassium hydrate until alkaline. Add excess of distilled water, shake. Results. Explain.
5. Place 5 mls of the solution from No. 2 in each of 5 test-tubes and add slowly one of the following reagents to each. Note the formation of a precipitate in each. Test the solubility of the precipitates in an excess of water as in 4, and note results. Tabulate results.

Reagent	Color of Precipitate	Solubility in Water
Tannic Acid		
Iodine in potassium iodide		
Picric acid		
Mercuric Pot. Iodide (Mayer's Reagent)		
Phosphotungstic acid		

6. To 10 mls of the solution from No. 2 add solution of potassium hydrate until alkaline, then add 10 mls of ether, shake, allow ether to rise to the top. Draw off ether and save. Add a few more mls of ether and proceed as before. Acidify a small amount of the remaining aqueous

solution with dilute sulphuric acid and test with mercuric potassium iodide.

Explain your results.

Shake the ethereal solution with a little of the dilute sulphuric acid, and test the acid solution (at bottom of tube) with the above reagent. Explain results.

Draw conclusions from the above experiments.

7. Boil 10 mls of quinine solution for a few minutes with 1 mil of sulphuric acid. Neutralize with solution of sodium hydrate, and apply Fehling's test for reducing sugars.

GLUCOSIDES

Definition :—Glucosides are those plant principles which when treated with dilute acids or submitted to the action of ferments split up and yield glucose as one of the decomposition products. Many but all do not contain nitrogen. A few are alkaloidal but most are neutral.

Experiments :

1. Test a 1% solution of glucoside (Use Salicin) with Fehling's solution.
2. Add 1/5 of volume of dilute sulphuric acid to another portion, boil 10 minutes in a water bath. Render alkaline with solution of sodium hydrate and apply Fehling's test.
3. To a third portion of the solution add a little saliva and heat at 40°C. for one-half hour. Apply Fehling's test.
4. Apply previous reagents for the precipitation of alkaloids. Tabulate results.

RESINS

These are solid plant substances, usually of an acid nature, insoluble in water, soluble in an alkali and water and in alcohol. The definition of the pharmaceutic class "resins" is those plant products soluble in alcohol, insoluble in water, obtained either as a residue from the distillation of an oleoresin or by pouring a concentrated alcoholic extract into water or acidulated water. If they occur mixed with a volatile oil they are termed *oleoresins*, if mixed

with a gum, *gum resins*, and if mixed with benzoic or cinnamic acid, *balsams*.

Experiments: Use commercial rosin. (Resin).

1. Test solubility in alcohol, water, turpentine, and boiling sodium hydrate solution. Explain your results.

VOLATILE AND FIXED OILS

Oils exist as fixed and volatile, or essential. An oil is a substance that greases, which leaves a stain when dropped on cloth that water will not wash off, a stain which renders paper translucent. They are termed fixed or volatile according to the permanency of this stain on warming, characters clearly defined by the name given to the two groups. Volatile oils are odorous principles, physically resembling the fixed oils but differing from them in being volatile and by being soluble in alcohol. To this group is due the odor of plants. They are called essential oils from the fact that they possess in a concentrated state the properties of the plants from which they are obtained.

Experiments: Use oil of turpentine for volatile and cotton seed oil for fixed oil.

1. Prepare 2 series of test tubes of 5 each. To series A, add 1 mil of oil of turpentine and to series B, 1 mil of cotton seed oil.

To No. 1 of each series add 5 mils of water.

To No. 2, 5 mils of alcohol, No. 3, 5 mils of chloroform, No. 4, 5 mils of ether, and to No. 4, series A, 5 mils of cotton seed oil and to No. 5, series B, 5 mils of oil of turpentine. Shake all and note solubility. Tabulate results.

2. Put a drop of oil of turpentine on glazed paper. Results. Heat high over a flame for a few minutes. Results. Repeat the experiment using cotton seed oil instead of oil of turpentine.
3. Rotate a glass stopper in the neck of a bottle of fixed oil, water, volatile oil. Note any differences. Which one greases the stopper? These bottles will be supplied.

SAPONINS AND SAPOTOXINS

These are neutral nitrogenous bodies characterized by foaming with water, emulsifying fats and laking blood corpuscles. A few are glucosides. The term saponin is given to the least poisonous of the group and sapotoxin to the most poisonous.

Experiments: Use Tincture of Soap Bark.

1. Shake a few drops of the above tincture with a few mls of water. Note results.
2. Place about 5 mls. of cotton seed oil in a test-tube. Add 25 drops of tincture of soap bark. Shake and note results. Add a little alcohol. Results. Is the emulsion permanent?
3. To a test-tube add 5 mls of a 0.9% solution of sodium chloride with 1/10% solution of saponin, then add two or three drops of defibrinated blood. Note results.
4. Repeat the experiment without using the saponin solution.

GUMS

Gums are amorphous transparent substances belonging to the group of carbohydrates. Some dissolve in water and others only swell up and form a jelly. All are insoluble in alcohol.

Experiment:

1. Test solubility of acacia and tragacanth in water and alcohol.

TANNINS

Tannins are the astringent properties of many plants. They exist chiefly as tannic and gallic acids.

Experiments: Use 1% solution of tannic acid.

1. To a few mls of tannic acid solution add a drop of ferric chloride solution. Note a green blue black color. Dilute until transparent. Add a few drops of sodium hydrate solution. Garnet color.
2. Add a little solution of lead acetate to a solution of tannic acid. Results.
3. Add a little solution of sodium hydrate to a solution of tannic acid. Results.

4. To a solution of quinine sulphate add some tannic acid solution. Results.
5. Add a solution of tannic acid to an albumen solution. Results.
6. Add a little tincture of iron to compound tincture of cinchona.

NOTE:—Tannins occurring naturally in plants give a greenish color with iron, while pathological tannins (Nutmalls) give a bluish color.

CHAPTER V.

INCOMPATIBILITY

Incompatibility means lack of agreement. It may be defined as that condition where two or more agents when brought together result in chemical decomposition, physical disassociation, or therapeutic opposition. In some cases the change may be desirable, (White Lotion, Black Wash), make little if any difference or may be undesirable. The change may result in precipitating or destroying certain drugs of the mixture, changing color only, forming new compounds without visible change or the ingredients may neutralize each other.

Incompatibility is usually classified as chemical, physical. (Pharmaceutic) and physiological or therapeutic.

CHEMICAL INCOMPATIBILITY occurs when a new chemical compound results (chemical change). It may, in general, be recognized in three ways. 1. Precipitation in which an insoluble precipitate is formed. 2. Effervescence or explosion-evolution of gas,—and 3. Change in color. In addition a new compound may be formed without any apparent change in the appearance of the liquid with possible disastrous results.

In order to avoid this form of incompatibility some knowledge of the chemistry of the agents must be understood. A good working basis is that substances are incompatible if used as tests for each other, or if they are antidotes.

PHYSICAL OR PHARMACEUTIC INCOMPATIBILITY results in the production of mixtures of unsightly appearance due to physical changes. This is largely a question of solubility and often occurs

when solids or liquids are added to solutions, thereby changing their densities. It occurs when there is a combination of such substances as are physically incapable of mixing. The most common physical incompatibilities result from mixing alcoholic solutions of resinous substances with water, (fluid extracts, tinctures, spirits, etc., ginger, Indian hemp, camphor), but may not in any way effect the action of the drugs.

PHYSIOLOGIC OR THERAPEUTIC INCOMPATIBILITY is where two or more drugs are prescribed which are antagonistic or contra-acting to each other in which case they may almost exactly neutralize each other or one may weaken the action of the other. Arecoline and atropine are good examples, yet no two drugs exactly oppose each other throughout their entire range of action and some latitude is always permitted.

Incompatibility is a subject very much overdrawn and unnecessary stress is placed upon it. Although it is possible to find a large number of incompatibilities for any active chemical, but few of these are ever likely to be encountered in prescription writing; and according to Bastedo, of these few, the result not infrequently makes no practical change in the medicinal value or is deliberately desired. According to the same author, the following are those most likely to be encountered in the practical use of drugs:

I. INCOMPATIBILITY DEPENDING ON CHANGE OF SOLVENT

A. *Precipitate when added to Aqueous Liquids.* Substances in alcoholic solution and insoluble in water; as in spirits, fluid extracts, and tinctures, especially resinous ones, like tincture of cannabis, benzoin, myrrh.

B. *Precipitation when added to Alcoholic Liquids.* Substances in aqueous solution and insoluble in alcohol; as solutions of many salts (sodium sulphate, ammonium chloride) and mucilage of acacia. Mere insolubility as of oils or bismuth subnitrate in water, makes these really incompatible with the solvent.

II. CHEMICAL INCOMPATIBILITIES

RULE 1. Acids and salts of acid reaction are incompatible with alkalies and salts of alkaline reaction and the halogen salts.

RULE 2. Highly oxidized substances, like chromium triox-

ide (chromic acid), potassium permanganate, and potassium chlorate are decomposed by organic matter. Potassium permanganate in solution turns brown; dry potassium permanganate or chromic acid may take fire or explode. Potassium chlorate, when rubbed with sulphur, hypophosphites, ammonium chloride, tannic acid or other organic substance, will explode violently.

RULE 3. Silver nitrate is incompatible with organic material and turns to black oxide or black metallic silver. With chlorides or hydrochloric acid it forms insoluble silver chloride.

RULE 4. (Mild mercurous chloride) calomel is incompatible with sodium carbonate and lime water. With the latter it makes a black precipitate of mercurous hydroxide, and forms "black wash", sometimes employed as an application to venereal sores.

Calomel is insoluble in water or alcohol, comparatively inert chemically, and bland to tissues.

RULE 5. Corrosive mercuric chloride (corrosive sublimate) is incompatible with iodides, many metallic salts, alkaloidal salts, tannic acid, lime water, and albumen.

With excess of lime water it forms a yellow precipitate of mercuric oxide, and forms "yellow wash", employed as an application to venereal sores. When the mercury salt is in excess, the precipitate is red oxychloride.

With soap, as on the surgeons hands, its antiseptic power is destroyed.

With potassium iodide it forms mercuric biniodide. The iodide is of a brilliant scarlet color and dissolves in excess of potassium iodide. These two salts are often prescribed together to form biniodide.

In albumen, as in white of egg or milk, we have the antidote when the drug is swallowed.

RULE 6. Lead acetate decomposes alum and other sulphates and the iodides, and tends to precipitate many organic substances, e. g., glucosides, from their solutions.

The admixture with alum makes Burow's solution. The precipitate of lead sulphate should be filtered out. The precipitate with the iodide is lead iodide of a brilliant yellow.

RULE 7. Ferric salts—(a) Make “ink” with tannic acid; (b) make blue to reddish or purple colors with compounds of the phenol group, such as phenol, resorcin, salicylates, etc.; (c) make red color with acetates, and (d) form a dirty brown precipitate with alkalies or alkaline salts.

RULE 8. Tannic acid is incompatible with alkaloidal salts, dry potassium chlorate (explodes), metallic salts, gelatine, and albumen. With ferric salts it makes “ink”. For salts of alkaloids and antimony it is the local antidote.

It occurs in many vegetable drugs, and preparations of these may not only precipitate alkaloidal salts, but may change the gelatin coating of a pill or gelatin capsule to a tough leathery insoluble substance. Alcohol may prevent the precipitation of alkaloidal salts by tannic acid, as in tinctures.

RULE 9. Chloral hydrate decomposes to chloroform under the influence of strong alkalies; and when mixed with camphor, menthol, thymol, and similar substances, undergoes a physical change to a liquid.

RULE 10. Alkaloidal salts are incompatible with—(a) Alkalies—the precipitate is the pure alkaloid. (b) Tannic acid—the precipitate is the insoluble tannate. (c) Iodine, iodides, and bromides—precipitate is the iodide or bromide. (d) Mercuric bichloride—the precipitate is the insoluble double salt.

Quinine in addition is especially precipitated by salicylates and benzoates.

All these precipitates are more soluble in alcohol than water, so may not show in tinctures and other alcoholic liquids.

RULE 11. Glucosides are incompatible for the most part with lead acetate and tannic acid, and are decomposed by the mineral acids.

Experiments:

Directions:—Tabulate results and so far as possible give kind of incompatibility and reason for same.

1. *Demonstration:*—Rub a little potassium chlorate and tannin in a mortar. *Students will not perform this experiment.*
2. Add a few drops of concentrated sulphuric acid to a few mls of water in a test tube. Note any change.

3. Add a few drops of a 10% solution of magnesium sulphate to a few mls of the following solutions: sodium hydroxide, sodium carbonate.
4. Add a few drops of mucilage of acacia to a few mls of alcohol.
5. Add a few drops of a solution of ferric chloride to 5 mls of each of the following solutions: sodium carbonate, albumen, acacia, sodium salicylate.
6. Add a few drops of a solution of ferrous sulphate to each of the following solutions: sodium hydrate, potassium hydrate, sodium carbonate, tannic acid, phenol, salicylate of soda, acetate of lead, albumen, potassium oxalate, sodium borate. Allow the last two to stand a few minutes before reading results.
7. Repeat the previous experiment using a solution of copper sulphate instead of ferrous sulphate.
8. Add a few drops of lead acetate solution to each of the following solutions: sodium chloride, albumen, sodium sulphate, potassium bromide.
9. Add equal parts of 5% solutions of lead acetate and zinc sulphate.
10. Add a few drops of a solution of mercuric chloride to each of the following solutions: zinc sulphate, quinine sulphate, albumen, lime water, ferrous sulphate plus heat, potassium iodide, then add excess of potassium iodide.
11. Recall experiments with tannin and mention incompatibilities.
12. Add a few drops of tincture of ginger to water, alcohol.
13. Repeat the above experiment using spirits of camphor instead of tincture of ginger.
14. Add a few drops of silver nitrate solution to each of the following: distilled water, tap water, solution of sodium chloride, albumen, potassium bromide. Allow the tube of distilled water and silver nitrate to stand in daylight for several days. Results.

15. Add 5 mls of an aqueous solution of sodium chloride to an equal amount of alcohol. Then add an excess of water. Explain your results.

CHAPTER VI.

PHARMACEUTIC METHODS

There are several processes in the manufacture of pharmaceutical preparations, and these vary with the nature of the crude drug and the character of the desired product. These processes are :

DESICCATION OR DRYING :—This is usually the first step in the preparation of crude drugs. It has three advantages, reduces bulk, assists preservation, and facilitates comminution. Drying was formerly done by storing in a dry, airy loft, but now most of it is done in special ovens. The degree of heat must not be high enough to destroy any of the desired or unstable ingredients. The next step is that of comminution.

COMMINUTION :—This is the reduction of the drug to smaller fragments. This process is now mainly done by machinery, quite similar to that used in grist or flouring mills. On a small scale the drug mill, which is similar in action to the coffee mill, may be used. The grinding has to be repeated several times in case of some drugs to get the powder fine enough. The mortar and pestle are used for friable substances. These are made of glass, wedgewood, porcelain and iron.

TRITURATION :—Trituration is employed where a finer powder is desired than can be obtained with a mill. It consists of rubbing with a rotary motion, *not pounding*, the substance in a mortar with a pestle. Some substances will not powder alone but will if mixed with another substance (pulverization by intervention) sugar of milk. Sometimes the substance requires moistening, as camphor with alcohol.

Certain drugs percolate better if used in a certain degree of fineness. They are, therefore, sifted and classified accordingly. If a very fine powder is desired of an insoluble substance, it may be mixed into a thick paste with water or alcohol and rubbed between two polished slabs, (*Levigation*) or placed on a marble slab, moist-

ened with alcohol or water and rubbed with a muller. In rubbing, a circular or figure eight motion should be used.

SEPARATION.—This is usually the next step in the preparation of drugs. Its purpose is to separate the desired ingredients from the inert or undesired. It may be accomplished in three ways. If the desired ingredients are volatile, they may be driven off by heat. That is by distillation and sublimation. If the substances are not volatile, the separation is usually done by exposing the crude drugs to the action of some solvent in which the desired ingredients are soluble and the undesirable, so far as possible, insoluble. The third method is by mechanical means as in the case of fixed oils where the separation is done by pressure.

SEPARATION BY HEAT.—This method can be used whenever the substances to be separated have different boiling points, and are not destroyed by the necessary degree of heat. This process differs as to whether the fixed or volatile portion is desired and if the latter, according as to whether it is a solid or liquid. The different processes of using heat are; distillation, sublimation, carbonization, ignition, desiccation and torrefaction.

DISTILLATION.—This is the process of converting a liquid into a gas and condensing the gas back again into a liquid. The apparatus necessary is some receptacle for heating the liquid, conducting off and condensing the gas. The ordinary worm still is a good example. Its purpose is to separate volatile from non-volatile agents and for purifying volatile substances. It may be divided into fractional, which means a separation of a mixture of liquids, and destructive where the substances are heated so strongly that they decompose and the volatile products which arise from the decomposition are saved. (Organic bodies as tar).

SUBLIMATION is a process exactly similar to distillation with the exception that solids are used instead of liquids. Usually the air is sufficient to cool and condense the vapors. (Benzoic acid, camphor, iodine.)

DESICCATION.—The object of desiccation is to drive off some undesired volatile substance from a solid. The fixed residue being the portion desired. If the heat is not sufficient to change the chemical composition, the process is termed desiccation. It simply means drying.

CARBONIZATION.—This is the process of heating organic substances under the exclusion of air. Its object is to change the chemical composition without oxidation. (Charcoal).

IGNITION.—This is the process of strongly heating a substance, usually in a crucible, with full access to air, so as to complete oxidation. Nothing but ashes is left.

TORREFACTION.—This means roasting. The object is to employ sufficient heat to alter some of the constituents without affecting others. Coffee, peanuts.

EVAPORATION.—This consists in vaporizing a solvent from a solution. The object is concentration of the desired dissolved substance.

SOLUTION.—This may be defined as the process of incorporating a solid into a liquid state of molecular subdivision, the result being a clear homogeneous fluid. In this case the molecules of the solid are diffused throughout the liquid, and are so widely separated that no solid particles are in any way discernable. In other words, the solid is liquified, and its molecules intermingle with those of the liquid, (solvent). Solutions may be classified as simple, chemical, unsaturated, saturated, and supersaturated. A *simple* solution is one occurring as described above. No chemical change is made. A *chemical solution* where chemical action takes place. *Unsaturated* where the solvent contains less of the substance than it will dissolve. *Saturated* when it contains all that it will dissolve, and *supersaturated* when some means is employed to make the liquid dissolve more of the substance than the usual amount of the solid. Example, heat in most cases, or hydrochloric acid with corrosive sublimate.

The process of solution is applied to most organic drugs for the purpose of separating the active ingredients from the insoluble inert. The object is to dissolve the greatest amount of solid with the least possible liquid, (menstruum). It accomplishes two purposes. 1. It gives a strong extract and (2) wastes no menstruum. Solution may be employed in various ways. All are combinations of two extremes, maceration and percolation, usually in the United States of both.

MACERATION.—This is simpler than percolation. It consists in simply leaving the drug in contact with the menstruum under suitable conditions, for a certain, or sufficient length of time. If maceration alone is used, a definite amount of the drug is placed in a container with a definite amount or portion of the menstruum and left a certain time, in many cases two weeks. The liquid is then strained off, the residue (marc) expressed and the mixed extract filtered.

The process is influenced by (1) degree of comminution. The finer the drug the less time is required. (2) The higher the temperature the quicker the solution. Different terms are given to the process according to the degree of temperature employed. *Maceration* is at room temperature, *Digestion* at 30°–40°C., *Decoc-tion* at boiling temperature. The application of heat is objectionable in certain cases because it injures some of the desired constituents or on account of the evaporation of either the constituent or solvent. (3) Time. Usually the longer the better. (4) Menstruum. This must in each case be adapted to the particular drug.

PERCOLATION.—Percolation or displacement, is the process whereby a powder contained in a suitable vessel is deprived of its soluble constituents by the descent of a solvent through it. (Remington).

The solvent, which is poured on the top of the powder, in passing downward exercises its solvent power on the successive layers of the powder until saturated, and is impelled downward by the combined force of its own gravity and that of the column of liquid above it, minus the capillary force with which the powder tends to retain it. A *percolator* is a vessel with a porous diaphragm below, into which the drug, in the form of a powder is introduced, and its soluble portions extracted by the descent of the solvent through it. The *menstruum* or solvent is the liquid poured on top of the powder. The liquid coming from the percolator, impregnated with the soluble constituents of the drug is the *percolate*.

The first portion of the percolate is always more dense, more highly colored and contains the largest proportion of the soluble principles, because the first proportion of the menstruum, in its descent through the powder, has the first opportunity to come in contact with the largest proportion of the soluble principles which are to be

found in the finer dust scattered through the powder, and in the thoroughly disintegrated particles, which offer but slight resistance to the passage of the menstruum. When successfully conducted, the first portion of the percolate will be nearly saturated with the soluble constituents of the substance treated; if the quantity of the menstruum be sufficient for its exhaustion, the last portion of the percolate will be destitute of color, odor and taste, other than that possessed by the menstruum itself.

The general rule in percolation is to moisten the powder. The reason for this is that most drugs are vegetable substances which in their natural state were moist. The process of desiccation has hardened and dried the tissues, so that they do not absorb moisture quickly, and when compressed, as they are when packed in a percolator, the resistance is still greater. If a dry powder is tightly packed in a glass percolator and water poured upon it, the water will penetrate the powder but a short distance. Its further passage is prevented by the particles which are immediately in contact with the water, which have become swollen to such a degree that they press tightly against the sides of the percolator, and thus entirely overcome the gravitating force and penetrating power of the water. If, on the other hand, the powder is moistened with sufficient water to satisfy its tendency to swell, *before it is packed in the percolator*, the addition of water is followed by its slow colation through the mass without stoppage. A moist powder like a moist sponge greedily absorbs moisture, but a dry powder like a dry sponge, repels attempts to moisten it.

Care should be used in preparing and packing a percolator, because upon this process largely depends the success of the operation. The powder should be packed firmly or moderately as directed. If packed too firmly the menstruum will not pass through readily, if not packed firmly enough the menstruum will pass through too quickly and the full strength of the drug will not be obtained; if packed unevenly, the menstruum will pass readily through one side of the mass and not come in contact with the other at all. The menstruum should descend uniformly and slowly through the drug.

DIRECTIONS FOR PERCOLATION

1. Moisten the powder and allow to macerate the specified length of time.

2. Place a small tuft of purified cotton in the neck of the percolator and moisten it with a few drops of the menstruum.

3. Transfer powder to a sheet of thick paper and pour the whole quantity from the paper to the percolator at one time.

4. Shake or jar the percolator gently until the powder is level and leave for from 15 minutes to several hours according to directions.

5. Pack the powder more or less firmly according to directions and the character of the substance and menstrum. In general the coarser the substance and the more alcoholic the menstruum, the greater the force may be employed.

6. Adjust cork with tube in the neck of the percolator.

7. Place a sheet of filter paper on top of the powder and hold it in place with a glass stopper or other glass weight.

8. Pour on menstruum through a funnel reaching nearly to the surface of the paper.

If the above conditions are observed, the menstruum will penetrate the powder until it has reached the cork.

When the liquid has reached the neck of the percolator, close the clamp which controls the flow of the percolate, and cover the percolator to prevent evaporation. Then allow to macerate as directed.

To begin percolation, loosen the clamp sufficiently to allow the liquid to drop very slowly.

RATE OF FLOW:—The Pharmacopoeia directs that in making fluidextracts, the rate of flow where 1000 grams of the drug are used should not exceed more than ten drops a minute: for official tinctures and other fluids of about the same strength, twenty drops per minute and the word slowly means a rate of flow corresponding to this. *With the amounts of powdered drugs used in this course the rate of flow for fluidextracts should be about 2 drops per minute and for tinctures about 3 to 4 drops per minute.*

EXPRESSION. This is the process of separating a liquid from a solid by pressure. It is especially used in pharmacy for the purpose of separating a liquid from a drug residue (marc) left

after percolating or in separating fixed oils. The ordinary tincture or fruit press may be taken as an example.

COLATION, or straining. This is the process of separating solid, coarse particles from a liquid by pouring through a cloth or strainer.

FILTRATION is the process of separating fine or coarse, solid particles from a liquid by pouring it through a finely porous material, such as a filter paper.

DECANTATION.—This means simply carefully pouring off most of the liquid portion, leaving the rest in the vessel. By repeating the process several times and adding more solvent each time, practically all the soluble material may be removed from the precipitate.

CLARIFICATION.—This is the process of rendering turbid materials clear and transparent by removing the suspended solid bodies. Often when the solid particles cannot be removed by the filter, they may be removed by agitating them with some insoluble powder, or by adding egg albumen, shredded filter paper and by boiling or by centrifuge.

CHAPTER VII.

DISPENSING

In dispensing medicines, every attention should be given to have the package neat and attractive. While any bottle or paper will serve in an emergency, we should so far as possible provide good, clean, unlabeled bottles, not old beer bottles, whiskey flasks, or patent medicine bottles, and dispense them wrapped in clean, new paper. Powders should always be placed in uniform paper and folded evenly, then wrapped in a neat package, or better still, dispensed in boxes of suitable size. These in turn should be neatly wrapped.

POWDERS-CHARTAE.—These are preparations of solid drugs in a fine state of division for external or internal use. Usually they are combinations of two or more drugs, and frequently one of the drugs only serves as a diluent or base. The drugs are usually mixed by triturating with a mortar and pestle although there are machines for this purpose. In mixing the materials, care should

be taken to get the ingredients thoroughly and uniformly mixed. The mixing should be done by placing the smallest amount of the mixture in a mortar, tritulating it with the next drug, then triturate after the addition of each drug. When individual powders are to be dispensed, the required number of papers, previously creased should be placed upon the table and the mixture transferred to them with a spatula. After all the mixture has been transferred to the papers, the amount in each should be equalized, so far as possible by the eye. This method of division at best is only approximate and for exact work, each powder should be weighed. Another very good method to divide the powder is to arrange it upon a smooth surface in the form of an elongated rectangle, and then divide this mass into equal portions with a spatula and transfer each portion to a paper.

To fold powders.—This is learned very quickly and easily with a little practice. It consists of first laying the required number of papers upon a table or other smooth surface. Each paper should be provided with a fold at the top of equal size. After the powders have been placed upon the papers, the next step is to bring the bottom of the paper up to the crease already made. The flap of the crease is then bent down. Another fold is then made at the flap. Finally all that remains is to fold and crease the ends so that each powder is equal in length. They may be equalized in length by breaking over the edge of a box or powder folder or the ends may be made to meet in each case. Papers may be folded upon either their long or short axis. Most people prefer to fold them upon their long axis although some prefer the other way for large powders. The chief advantages of the latter method is that a smaller paper is required and that the powder will be much flatter and consequently more easily wrapped. The following figures represent the various steps folding both on the long and short axis of the paper. Fig. 1.

After the powders have all been folded and smoothed down, they should be packed with the flaps alternating. This method of stacking saves a considerable amount of bulging and springing out of the powders under pressure.

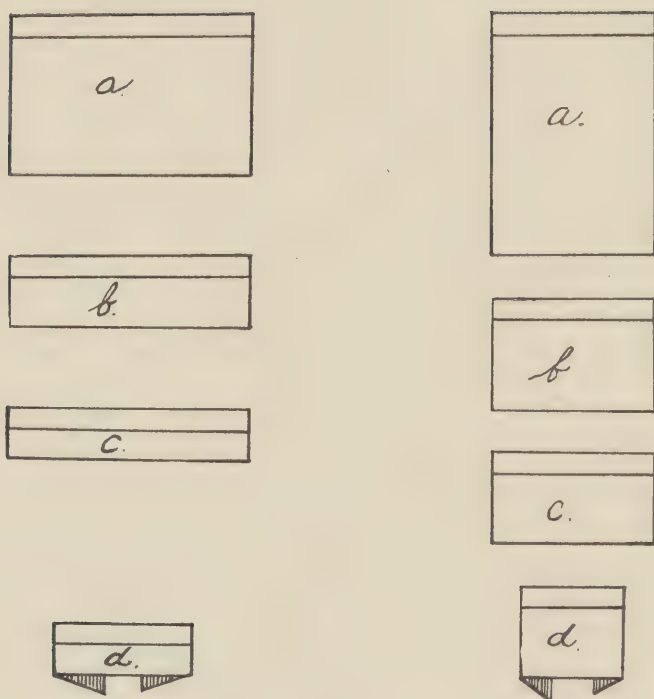


Fig. I. Folding powders.

Pills and tablets should be dispensed in small envelopes, or if in boxes a small amount of absorbent cotton should be placed upon them in the box to prevent rattling. The boxes should be wrapped neatly.

To wrap round boxes.—Fig. 2. Place box on paper, bring two opposite ends together, fold and make a crease about one-half inch in width. Then make a second fold on the first crease. This should bring the paper firmly around the edge of the box. Fold paper around the rest of the box and tie.

Oblong and square boxes.—Fig. 3, are folded in much the same way. The first two steps are identical, except the ends are to be folded in tightly against the ends of the box. A string is then passed two ways around the box and tied.

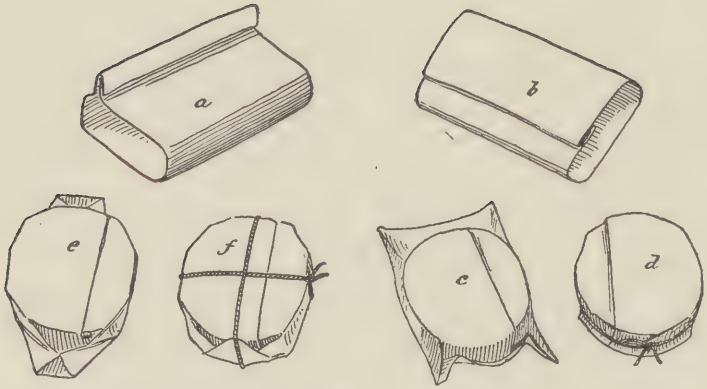


Fig. II. Wrapping round boxes (after Arny).

Packages.—Fig. 4. In folding packages, first bring up two opposite sides and crease evenly as in wrapping boxes. Fold this crease over on itself. Then temporarily close one end. Stand package on this end and carefully crease and fold the opposite end away from the flap. The package is then reversed, the other end reopened and closed the same as the first one. Tie around both

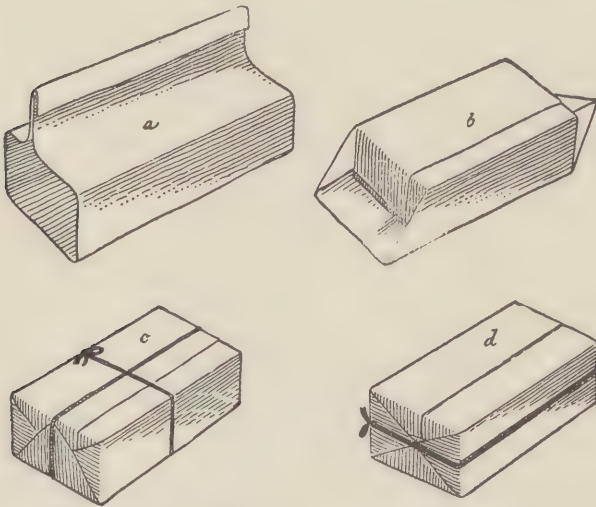


Fig. III. Wrapping oblong boxes (after Arny).

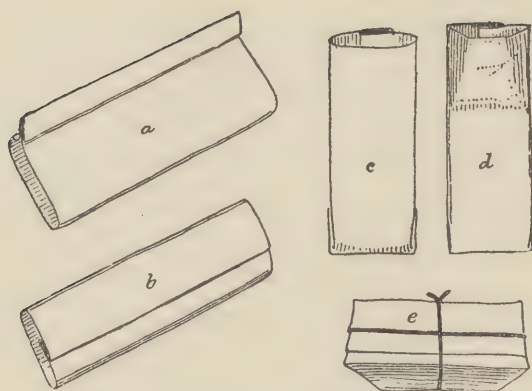


Fig. IV. Folding packages (after Army).

ways. This is similar to folding powders, and is used by some for that purpose, although a uniform size cannot be so easily obtained as where the papers are creased.

Bottles.—Fig. 5. To wrap bottles. Make the first two folds as in case of wrapping a box. The open edge at the base is then folded in flaps. The paper around the neck should be creased and folded in flaps. Tie around both ways.

Labelling.—Write labels plainly and neatly.

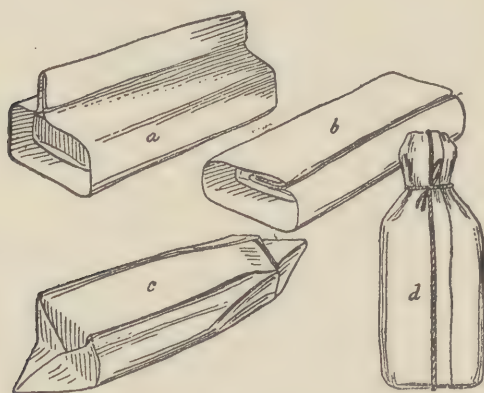


Fig. V. Wrapping bottle (after Army).

Exercise.—Dispense all packages neatly wrapped and tied.

℞. Tonic for horse.
 Arseni Trioxidi grs. xxx
 Potassii Nitratis ℥ iij
 Ferri Sulphatis ex. ℥ iij
 Nucis Vomicae ℥ jss
 Misce. Fiant Chartae No. 24.
 Sig. One powder morning and night.

Solution.

℞. Collyrium.
 Acidi Borici ℥ jss
 Aquae Destillatae q. s. ad. ℥ iv
 Misce. et fiat Solutio.
 Sig. A few drops in the eye every 6 hours.

Capsules.

℞.
 Amyli grs. xxx
 Carbo ligni grs. xx
 Misce. Fiant Capsulae No. 10.
 Sig. Ad libitum.

Laxative Pills for dog.

℞ Pilulae Aloes No. 12.
 Sig. One in the evening or early morning.

CHAPTER VIII.

PHARMACY PROPER

The United States Pharmacopoeia divides its preparations into certain groups which have been established by long usage. They may be tabulated as follows:

Liquid Preparations.

1. Solutions of volatile substances.

Aqueous	Aquae (waters)
Alcoholic	Spiritus (spirits)

2. Solutions of non-volatile substances.

a. Simple solutions

Aqueous	Liquores (solutions)
Aqueous (Viscid)	
Mucilagines)	Mucilages
Aqueous Saccharine	Syrupi (syrups)
Mellifluous	Mellatae (Honeys)
Alcoholic	Tinctures except tincture of Iodine
Alcoholic Saccharine	Elixirs
Glycerinic	Glycerites
Ethereal	Collodia
Oleaginous	Oleates

b. Made by maceration or percolation.

Aqueous	Infusions and decoctions
Alcoholic	Tinctures and fluidextracts
Vinous	Wines
Ethereal	Oleoresins
Acetous	Vinegars

3. Liquids containing undissolved matter.

a. Internal use.

Aqueous with neither oil nor resin—	Mixtures
Aqueous with either oil or resin—	Emulsions

b. External use

Oleaginous	Liniments
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Solid Preparations

1. Made by maceration or percolation

A. Evaporation	Extracta (extracts)
B. Precipitation	Resinae (resins)

2. Made without maceration or percolation

a. For administration by mouth in undivided portions

Pulverised	Chartae or powders
Semisolid masses	Massae or masses
Semisolid (sweet)	Confections

b. Individual doses

Globular masses	Pilulae or pills
Disk like doses	Troches

c. By rectum

Suppositories

d. For external use

Greasy masses used as

Plaster	Cerates
By inunction	Unguenta (Ointment)
Moist masses	Cataplasma (Poultices)
Sticky masses	Plasters
Spread on or absorbed by paper	Chartae

Tabellae—Tablets,

Tablet—Triturates

Tablets—Hypodermic

Tablets—Dispensing

Tablets—Compressed

Tablets—Coated.

Boli-Balls—(Sing. Bolus)

Haustus—Drench

Electuaria—Electuary.

AQUAE

Waters are aqueous solutions of volatile substances. They differ from spirits, which are alcoholic solutions, and from liquores, which are aqueous solutions of non-volatile substances. There are twenty official waters and a general formula for aromatic waters in the Pharmacopoeia of 1910.

They are divided into three classes according to their method of preparation: 1, Simple solution. 2, Filtration through an absorbent powder. 3, Distillation. The following table mentions the official waters and designates the manner of preparation of each.

Simple solution or dilution

Aqua Amygdalae Amarae—Bitter almond
“ Aurantii Florum—Orange flowers
“ Chloroformi—Chloroform
“ Creosoti—Creosote
“ Rosae—Rose

Filtration

- Aqua Anisi—Anise
- “ Camphorae—Camphor
- “ Cinnamomi—Cinnamon
- “ Foeniculi—Fennel
- “ Menthae Piperitae—Peppermint
- “ Menthae Viridis—Spear-mint

Distillation

- Aqua Aurantii Florum Fortior—Stronger Rose Water.
- “ Destillata—Distilled Water
- “ Destillata Sterilisata—Sterile distilled water
- “ Hamamelidis—Witchhazel
- “ Rosae Fortior—Stronger Rose Water.

Gaseous Solution

- Aqua Ammoniae—Ammonia Water
- “ Ammoniae Fortior—Stronger Ammonia Water.

The process of simple dilution or solution consists of adding the drug to a sufficient amount of water and agitating. In case of a gaseous solution, the gas must first be generated in a suitable apparatus, washed and passed into a cylinder containing water.

Filtration through an absorbent powder. Excepting in the case of camphor water, this process is employed to obtain a saturated solution of volatile oil. Since these oils are but slightly soluble in water, they are triturated with an insoluble absorbent powder to separate them into finely divided form. After trituration with the powder, the water is gradually added. The result is that the finely divided drug is better brought into solution. Several powders have been recommended for use but all were more or less soluble and the Pharmacopoeia specifies purified talcum. This is the method specified in the general formula for aromatic waters.

Distillation: In this case the product is put into a still with water and heat applied. The vapors arising from the still carry with them the volatile aromatic principles of the plant.

Waters are usually employed as pleasant vehicles for solution of various salts.

*First class—Solution.**Aqua Chloroformi—Chloroform Water.*

Chloroform .

Distilled Water, recently boiled, each a sufficient quantity.

To a convenient quantity of recently boiled distilled water (about 100 mls) contained in a dark amber colored bottle, add enough chloroform (1-2 mls) to maintain a slight excess of the chloroform after the contents have been repeatedly and thoroughly shaken. Preserve in a cool, dark place.

When required for use, pour off the needed quantity, refill the bottle with recently boiled distilled water and saturate by thorough agitation, taking care that there is always an excess of chloroform present.

*Second class**Aqua Camphorae—Camphor Water.*

Camphor	0.8 Gm.
Alcohol	0.8 mls
Purified Tale	1.5 Gm.
Distilled Water, recently boiled a sufficient quantity	

to make 100.0 mls

Triturate the camphor with the alcohol in a mortar, add the purified tale, continue the trituration until the alcohol has evaporated and add the recently boiled distilled water. Filter and pass through the filter until clear.

Remarks. This is the only water made by triturating with tale in which the base is not a volatile oil.

Aqua Cinnamomi—Cinnamon Water

Oil of Cinnamon	0.2 mil (3 drops)
Purified Tale	1.5 Gm.
Distilled Water, recently boiled, a sufficient quantity to make	100.0 mls

Triturate the oil of cinnamon with the purified tale, then gradually add the water under constant trituration, filter and continue to pass through the filter until clear.

Remarks:—This is practically the formula for aromatic waters, *Aqua Aromatica*.

LIQUORES—LIQUORS—SOLUTIONS

Liquors are aqueous solutions of non-volatile substances. There are 25 official solutions in the Pharmacopoeia. They may be divided into two classes according to the method of preparation. That is (1) *Simple solution* (Liquor Acidi Arsenosi) and (2) *solution through chemical change* (Liquor Ammonii Acetatis). The following table of official liquors indicates their method of preparation.

SIMPLE SOLUTION

1. Liquor Acidi Arsenosi—Solution of Arsenous Acid.
2. “ Arseni et Hydrargyri Iodidi—Solution of Arsenous and Mercuric Iodides
3. “ Formaldehydi—Solution of Formaldehyde.
4. “ Hypophysis—Solution of the Pituitary Body.
5. “ Iodi Compositus—Comp. Sol. of Iodine, Lugol's Solution.
6. “ Plumbi Subacetatis Dilutus.—Dil. Sol. of Lead Subacetate
7. “ Potassi Hydroxidi—Solution of Potassium Hydroxide
8. “ Sodii Arsenatis—Solution of Sodium Arsenate.
9. “ Sodii Chloridi Physiologicus—Physiological Salt Solution
10. “ Sodii Glycerophosphatis—Sol. of Glycerophosphates
11. “ Sodii Hydroxidi—Sol. of Sodium Hydroxide.

CHEMICAL ACTION

1. Liquor Ammonii Acetatis—Sol. of Ammonium Acetate.
2. “ Calcis—Lime water
3. “ Cresolis Compositus—Compound Solution of Cresol
4. “ Ferri Chloridi—Sol. of Iron Chloride

5. “ Ferri et Ammonii Acetatis—Sol. of Iron and Ammon. Acet.
6. “ Ferri Subsulphatis—Sol. of Ferric Subsulphate.
7. “ Ferri Tersulphatis—Sol. of Ferric Sulphate
8. “ Hydrogenii Dioxidii—Sol. of Peroxide of Hydrogen
9. “ Magnesii Citratis—Sol. of Magnesium Citrate
10. “ Plumbi Subacetatis—Sol. of Lead Subacetate
11. “ Potassii Arsenitis—Sol. of Potassium Arsenite
12. “ Potassii Citratis—Sol. of Potassium Citrate
13. “ Sodii Chlorinatae—Sol. of Chlorinated Soda
14. “ Zinci Chloridi—Sol. of Zinc Chloride.

LIQUOR ACIDI ARSENOSI

This is an aqueous solution which should contain not less than 0.975 per cent. nor more than 1.025 per cent. of arsenous acid, corresponding to approximately 1 per cent.

Arsenic Trioxide	0.5 Gm.
Diluted Hydrochloric Acid	2.5 Gm.
Distilled Water, a sufficient quantity	

to make 50. Gms.

Mix the diluted hydrochloric acid with 12.5 grams of distilled water in a tared (weighed) flask, add the arsenic trioxide, and boil the mixture until the arsenic trioxide is completely dissolved. Then allow it to cool, add enough distilled water to make the product weigh 50.0 grams. and filter.

Remarks. A clear, colorless liquid, odorless, having an acidulous taste and acid reaction. This preparation is employed in those prescriptions in which Fowler's solution would be incompatible.

LIQUOR CALCIS. Lime Water

This is a saturated aqueous solution, which should contain not less than 0.14% of Pure Calcium Hydroxide. $(\text{Ca}(\text{OH})_2)$.

The percentage of Calcium Hydroxide varies with the temperature at which the solution is prepared, and diminishes as the tem-

perature rises. That is, *Calcium Hydroxide* is more soluble in cold than in hot water.

Lime

5.0 Gm.

Distilled Water, a sufficient quantity.

Slake the lime by the very gradual addition of 100 mls of Distilled Water, and agitate occasionally during half an hour. Allow the suspended particles to subside, decant the supernatant liquid and reject it.

Transfer the magma of calcium hydroxide to a filter and wash it repeatedly with boiling distilled water, until the washings, after acidulation with nitric acid show not more than a faint cloudiness with silver nitrate (T. S.) Return the magma to a suitable container, add 500 mls of distilled water, agitate it thoroughly, let the mixture stand for 24 hours, agitate again, and when the coarser particles of solid matter have subsided, pour the liquid containing the undissolved calcium hydroxide in suspension into a tightly stoppered bottle, so as to keep the solution saturated. Pour off the clear solution when required for use. From time to time shake the bottle to insure a saturated solution.

Description:—A clear, colorless liquid without odor and having an alkaline taste. The object of slaking the lime with a small amount of water which is rejected is because most commercial lime contains calcium chloride which is irritant. This is easily soluble. Consequently, by macerating and washing the lime with water, practically all the calcium chloride will be removed. Since the calcium hydroxide is but sparingly soluble in water, only a small amount will be thrown away with the first water.

Use:—Antacid.

LIQUOR CRESOLIS COMPOSITUS—Compound solution of cresol

Cresol	100.0 Gm.
Linseed Oil	60.0 Gm.
Potassium Hydroxide	16.0 Gm.
Alcohol	6.0 mls
Water, a sufficient quantity	

to make 200.0 Gm.

Heat the linseed oil in a tared vessel of a capacity equal to about four times the bulk of the ingredients, on a water bath to a temperature of 70°C . Dissolve the potassium hydroxide in 10 mls of water and warm to 70°C ., add it to the linseed oil and mix thoroughly. Then incorporate the alcohol and continue to heat the mixture without stirring until a small portion is found to be soluble in boiling water without the separation of oily drops. While yet warm add the cresol and mix thoroughly, maintaining the temperature at about 70°C ., until a clear solution is produced. Finally add sufficient water to make the finished product weigh 200 grams.

Note:—The Pharmacopoeia directs that 10.8 Gm. of sodium hydroxide may be substituted for the 16 Gm. of potassium hydroxide

Remarks:—The above solution is a 50 per cent. solution of cresol in an alkaline linseed oil soap. It is similar to many popular and “trade-named antiseptics” such as *Lysol*, *Creolin*, etc. The commercial cresol used in this preparation is a mixture of cresols. It is commonly called “*Cresylic Acid*.”

LIQUOR POTASSII ARSENITIS—Solution of Potassium Arsenite.

This is an aqueous solution which should contain Potassium Arsenite corresponding in amount to not less than 0.975 per cent, nor more than 1.025 per cent. of arsenic trioxide. For practical purposes it is a 1 per cent. solution.

Arsenic Trioxide	1.0 Gm.
Potassium Bicarbonate	2.0 Gm.
Compound Tincture of Lavender	3.0 Gm.
Distilled Water, a sufficient quantity	

to make 100.0 Gms.

Boil the potassium bicarbonate and arsenic trioxide, in a tared dish, with 10 gms. of distilled water, until a solution has been effected. Then add enough distilled water to make the solution weigh 97 gms.; then add the Compound Tincture of Lavender. Filter through paper.

Remarks:—This preparation is commonly called “Fowler’s Solution.” It contains 1% of Arsenic Trioxide colored with Compound Tincture of Lavender.

LIQUOR IODI COMPOSITUS—Compound Solution of Iodine

Iodine	2.5 Gm.
Potassium Iodide	5.0 Gm.
Distilled Water, a sufficient quantity	

to make 50.0 Gms.

Dissolve the iodine and potassium iodide in a sufficient quantity of distilled water to make the product weigh 50.0 grams. Keep the solution in a glass stoppered bottle.

Remarks:—This solution is commonly called “Lugol’s Solution”. It contains five per cent. of Iodine dissolved in water by means of ten per cent. of Potassium Iodide. This shows the interesting fact that while iodine is sparingly soluble in water, it is freely so in solutions of potassium iodide.

LIQUOR PLUMBI SUBACETATIS—Solution of Lead subacetate

An aqueous solution which should contain in solution not less than 18 per cent. of lead.

Lead Acetate	18.0 Gm.
Lead Oxide	11.0 Gm.
Distilled Water, a sufficient quantity	

to make 100.0 Gms.

Dissolve the lead acetate in 70 mls of boiling distilled water and add this solution slowly and in portions to the lead oxide, which has previously been rubbed to a smooth paste with 10 mls of distilled water, and place in a porcelain dish of about 100 mls capacity. Boil this mixture during half an hour with occasional stirring, adding distilled water as required to maintain about the original volume. Finally when cool, filter the solution, protecting it as much as possible from the air, and add sufficient distilled water, which has previously been boiled and cooled, to make the finished product weigh 100 grams. Keep the solution in well stoppered bottles.

Remarks:—The above solution is known as *Goulard’s Extract*. It is used externally as a sedative astringent wash in minor skin

diseases, such as bruises, etc. The dilute water is to be preferred for use.

LIQUOR PLUMBI SUBACETATIS DILUTUS. Diluted solution of lead acetate.

Solution of Lead Subacetate	4.0 Gm.
Distilled Water, a sufficient quantity	
to make	100.0 Gms.

Mix the solution of lead subacetate with enough distilled water, previously boiled and cooled, to make the product weigh 100.0 grams. Keep in well stoppered bottles.

LIQUOR AMMONII ACETATIS—Solution of Ammonium Acetate

An aqueous solution which should contain not less than seven per cent of Ammonium Acetate, with small amounts of Acetic and Carbonic Acids.

Ammonium Carbonate	2.5 Gms.
Diluted Acetic Acid	50.0 mls

Add the ammonium carbonate, which should be in hard translucent pieces, gradually to the cold dilute acetic acid, and stir until dissolved. It should be freshly prepared when wanted.

Remarks:—This preparation is frequently called “*Spirits of Mindererus*”. It is a refreshing refrigerant.

CHAPTER IX.

MUCILAGINES—MUCILAGES

Mucilages are aqueous adhesive liquors or jelly-like preparations containing a viscid substance (gum or starch) either in solution or suspension. All mucilages are prone to decomposition and on this account should be freshly prepared for internal use. The following are official:

Mucilago Acaciae	Mucilage of Acacia.
Mucilago Tragacanthae	Mucilage of Tragacanth.

MUCILAGO ACACIAE

Acacia, in small fragments	17.5 Gms.
Distilled Water, a sufficient quantity	

to make	50.0 Gms.
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Place the acacia in a tared bottle or flask having a capacity not exceeding 50 mls, wash the drug with cold water, allow it to drain, and add enough warm distilled water to make the mixture weigh 50 grams. Securely stopper the container and agitate it from time to time until the acacia is dissolved. Strain the Mucilage and preserve it in small, well-filled bottles in a refrigerator or in a cool place.

Note:—Mucilage of acacia should be frequently prepared and must not be dispensed if sour or mouldy.

Remarks:—The U. S. P. directs that the mucilage of acacia be prepared from small pieces, not powdered acacia. For general prescription purposes, however, the powder is often used, since its solution can be more readily obtained.

Mucilage of acacia is used principally to hold insoluble particles in suspension and as an excipient for pills.

SYRUPI—SYRUPS

Syrups are concentrated solutions of sugar in water usually medicated or flavored. A concentrated aqueous solution of sugar in water is called "*syrup*" or "*simple syrup*." If the substance added to the simple syrup is a pleasant fruit or aromatic, the product is termed a "*flavored syrup*", while if the material added is of a medicinal nature, the product is a "*medicated syrup*". There are 22 official syrups. Many of these are of but little importance so a list will not be given. According to the method used in manufacture, syrups may be classified as follows: 1. Solution with heat, e. g. Syrups Calcis. 2. Agitation of sugar with medicated liquids or simple admixtures without heat, e. g., Syrups Pruni Virginiae. 3. Simple addition of medicated liquids to syrup, e. g., Syrups Zingiberis. 4. Maceration or digestion, e. g., Syrupus Picis Liquidæ.

SYRUPUS—Simple syrup.

Sugar, in dry crystalline granules	85.0 Gms.
Distilled Water, a sufficient quantity	
to make	100.0 mls

Dissolve the sugar with the aid of heat in 45 mls of distilled water, raise the temperature to the boiling point, strain the liquid, and pass enough distilled water through the strainer to make the product, when cold, measure 100.0 mls. Mix thoroughly.

Syrup may also be prepared in the following manner: Place down into the neck of a suitable percolator, a small tuft of purified cotton about one-half inch in thickness, well fitted to the sides of the percolator and moisten it with a few drops of distilled water; introduce the sugar into the percolator, make its surface level without jarring or shaking, then carefully pour upon it 45 mls of distilled water, and regulate the flow, if necessary, so that the liquid will pass out in rapid drops. Return the first portions of the percolate, until it runs through clear, and when all the liquid has passed, follow it by distilled water, added in portions, so that all the sugar may be dissolved, and the product measure 100.00 mls. Mix thoroughly.

Either method produces a saturated solution of sugar. If more sugar is used in the hot process, it will crystalize, and if less is used it will not keep well.

SYRUPS ACIDI CITRICI—Syrup of Citric Acid

Citric Acid	0.5 Gm.
Distilled Water	0.5 mil
Tincture of Fresh Lemon Peel	0.5 mil
Syrup, a sufficient quantity	
to make	50.0 mls

Dissolve the citric acid in the distilled water, and add the solution to 47.5 mls of syrup, mixing it well, then add the tincture of fresh lemon peel, shake the mixture and add enough syrup to make the finished product measure 50 mls.

Remarks:—This is used for flavor only. It is similar to lemon flavor at soda fountains.

SYRUPS ZINGIBERIS—Syrup of Ginger

Fluidextract of Ginger	3.00 mls
Alcohol	2.00 mls
Magnesium Carbonate	1.00 Gm.
Sugar	82.00 Gm.

Water, a sufficient quantity
to make 100.0 mls

Mix the fluidextract of ginger with the alcohol, then triturate the liquid in a mortar with the magnesium carbonate and six grams of the sugar. Then gradually add 43 mls of water, with constant trituration, and filter. Dissolve the remainder of the sugar in the clear filtrate, with the aid of gentle heat, strain the syrup while hot, and add a sufficient quantity of water to make the product measure 100 mls.

MELLITA—HONEYES

Honeyes are thick liquid preparations containing medical agents blended with honey. In the early days of medicine they represented the most popular class of medical preparations, but have now been almost entirely replaced by the elixirs and syrups. The U. S. P. recognizes 3 official honeyes.

Mel	Honey
Mel Depuratum	Clarified honey.
Mel Rosae	Honey of Rose.

MEL ROSAE—Honey of Rose.

Fluid Extract of Rose	3.00 mls
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Clarified Honey, a sufficient quantity
to make 25.00 Gms.

Mix the fluidextract of rose in a tared vessel with enough clarified honey to make the product weigh 25 grams.

Remarks:—Used principally in the preparation of Massa Hydrargyri.

EMULSA—EMULSIONS

Emulsions are aqueous preparations for internal use, in which resinous or fatty substances are suspended by means of mucilage or other viscid material. Acacia, Tragacanth and Yolk of Egg are often used for this purpose. (Emulsifiers). In some instances, as in the case of emulsions of gum resins, the gum needed to form the emulsion is found present with the resin. The seeds of some plants also contain an albuminous substance, which serves as an emulsifier for the oil also present in the seed, rendering the addition of gums necessary. The emulsions are all quite unstable and *accordingly should be freshly prepared for use*.

In making emulsions of fixed oils, in which case Emulsion of Cod Liver Oil serves as the best example, either of two processes may be employed: the English and the Continental. The latter is usually the more satisfactory. With this method a nucleus or primary emulsion is prepared first with certain proportions of the ingredients, and this can be further diluted with water or flavor without fear of splitting, (Separation). The proportion by weight is: oil 4, water 2, and gum 1, or in other words use twice as much oil as water, and twice as much water as gum. The nucleus is then diluted with water or flavor to the desired amount.

The following are official:

Emulsum	Amygdalae
“	Asafoetidae
“	Olei Morrhuæ
“	Olei Terebinthinae

EMULSUM OLEI MORRHUÆ

Cod Liver Oil	25.0	mils
Acacia, in fine powder	6.25	Gm.
Syrup	5.0	mils
Methyl Salicylate	0.2	mil
Water, a sufficient quantity		

to make 50.0 mils

Thoroughly mix the acacia with the cod liver oil in a dry mortar or other suitable vessel, then add at once 12.5 mils of water

and triturate lightly and gently until a thick homogeneous emulsion is produced; to this add the Methyl Salicylate and the syrup with enough water to make the product measure 50.0 mls and mix thoroughly.

MISTURAE—MIXTURES

Mixtures are aqueous preparations for internal use containing in suspension insoluble, non-fatty substances. They are not permanent as a rule and should be freshly prepared. They should be dispensed with a shake label. Two are official, *Mistura Cretae* and *Mistura Glycyrrhizae Composita*.

MISTURA CRETAE—Chalk Mixture

Compound Chalk Powder	10.0 Gm.
Cinnamon Water	20.0 mls
Water, a sufficient quantity	
to make	50.0 mls

Gradually add the cinnamon water and about 20 mls of water to the compound chalk powder in a mortar, triturating until the mixture is uniform; transfer this to a graduated vessel, rinse the mortar with enough water to make the product measure 50 mls. Mix the whole thoroughly. This substance should be freshly prepared before use.

Used for diarrhea in young animals.

MISTURA GLYCYRRHIZAE COMPOSITA—Compound glycyrrhiza mixture, Brown Mixture.

R

Pure Extract of Glycyrrhiza	3.0 Gm.
Syrup	3.0 mls
Acacia, granulated	3.0 Gm.
Antimony and Potassium Tartrate	0.024 Gm.
Camphorated Tincture of Opium	12.0 mls
Spirit of Nitrous Ether	3.0 mls
Water, sufficient quantity	
to make	100.0 mls

Rub the pure extract of glycyrrhiza and acacia in a mortar with 50 mls of warm water, until they are dissolved. Allow the solution to cool. Transfer the solution to a graduated vessel, add the antimony and potassium tartrate dissolved in 1.2 mls (18 drops) of hot water, then the other ingredients and rinse the mortar with enough water to make the product measure 100.0 mls. Mix the whole thoroughly.

MAGMA

Magmae are aqueous preparations containing thick, tenaceous precipitates. Two are official. Magma Bismuthi and Magma Magnesiae.

MAGMA MAGNESIAE—Magma of Magnesia, Milk of Magnesia.

Magnesia Magma yields not less than 6.5 per cent. nor more than 7.5 per cent. of $\text{Mg}(\text{OH})_2$.

Magnesium Carbonate, in fine powder	12.5 Gm.
Sodium Hydroxide	8.0 Gm.
Distilled Water, a sufficient quantity	

to make 100.0 mls.

Mix the magnesium carbonate with enough distilled water (about 50 mls) and make a smooth mixture. Dissolve the sodium hydroxide in 40 mls of distilled water, add the solution to the magnesia mixture with constant stirring, and agitate it frequently during 15 minutes. Wash the resulting magma by decantation, using 200 mls of distilled water each time, until the red color produced in 50 mls of the washings by 3 drops of phenolphthalein (T. S.) is discharged by the addition of 1 drop of diluted sulphuric acid. Then allow the precipitate to subside until it measures 100.0 mls, decant the supernatant liquid, transfer the product to wide-mouthed bottles, and tightly stopper with corks which have been dipped in melted paraffin.

Note:—The distilled water in this preparation may be replaced by water which has been heated to the boiling point with powdered magnesium carbonate (5 Gm. in each 1000 mls) and then filtered. One drop of oil of peppermint or a sufficient quantity of oil of anise or other flavor may be added is desired.

SPIRITUS—SPIRITS

Spirits are alcoholic solutions of volatile substances. As in case of waters, the volatile substance may be solid or liquid. Spirits containing some aromatic flavoring principles are frequently called "essences". They may be prepared in the following ways: 1. Dilution or solution. 2. Solution by macreation. 3. Solution by chemical action. Fifteen are official.

The following table of official spirits indicates the method by which prepared:

SIMPLE SOLUTION

Spiritus Ammoniae Aromaticus	Aromatic Spirits of Ammonia
" Amygdali Amarae	Spirit of Bitter Almond
" Anisi	" " Anise
" Aetheris	" " Ether
" Aurantii Compositus	Compound Spirits of Orange
" Camphorae	Spirit of Camphor
" Chloroformi	" " Chloroform
" Cinnamomi	" " Cinnamon
" Glycerylis Nitratis	" " Nitroglycerin
" Juniperi	" " Juniper
" Juniperi Compositus	Compound Spirits of Juniper
" Lavandulae	Spirit of Lavender

SOLUTION BY MACERATION

Spiritus Menthae Piperitae	Spirit of Peppermint
" Menthae Viridis	" " Spearmint

CHEMICAL ACTION

" Aetheris Nitrosi	Sweet Spirits of Niter
	Spirit of Nitrous Ether

SPIRITUS CAMPHORAE—Spirits of Camphor

Camphor	5.00 Gm.
Alcohol, a sufficient quantity	
to make	50.00 mls

Dissolve the camphor in 40 mls of alcohol, filter through paper, and pass enough alcohol through the filter to make the product measure 50 mls.

Remarks:—Valuable carminative in colic and other intestinal disturbances, antipyretic. Externally rubifacient for sprains, bruises, etc.

SPIRITUS AMMONIAE AROMATICUS—Aromatic Spirits of Ammonia.

Ammonium Carbonate, in translucent pieces	3.4 Gm.
Ammonia Water	9.0 mls
Oil of Lemon	1.0 mil
Oil of Lavender Flowers	0.1 mil
Oil of Myristica (nutmeg)	0.1 mil
Alcohol	70.0 mls
Distilled Water, a sufficient quantity	

to make 100.0 mls

To the ammonia water, contained in a flask, add fourteen (14) mls of distilled water, and afterwards the ammonium carbonate reduced to a moderately fine powder. Close the flask and agitate the contents until the ammonium carbonate is dissolved and allow it to stand for twelve hours. Introduce the alcohol into a graduated bottle of suitable capacity, add first the oils, then gradually the solution of ammonium carbonate, and afterwards enough distilled water to make the product measure 100 mls. Set the liquid aside during 24 hours in a cool place, occasionally agitating it, then filter through paper, in a well covered funnel. Keep the product in glass stoppered bottles in a cool place.

Remarks:—When first prepared, this preparation is colorless, but soon assumes an amber hue on standing. It is a valuable heart and respiratory stimulant in collapse, dyspnea, and pulmonary congestion. It serves as an antacid and carminative in various digestive disorders. It should be given in capsule or well diluted (1–10) in water or oil.

ELIXIRIA—ELIXIRS

Elixirs are hydro-alcoholic solutions of an aromatic substance and sugar. They contain from 20 to 25% of alcohol. The following are official:

Elixir Aromaticum	Aromatic Elixir
Elixir Glycyrrhizae	Elixir Glycyrrhiza (Licorice)

Aromatic elixir is used as a base for most elixirs while the elixir of glycyrrhiza is used almost entirely as a flavor.

ELIXIR AROMATICUM

Compound Spirit of Orange	1.2 mls
Syrup	37.5 mls
Purified Tale	3.0 Gm.
Alcohol	
Distilled Water, each a sufficient quantity	

to make 100.00 mls

To the compound spirit of orange, add enough alcohol to make 25 mls. To this solution, add the syrup in several portions, agitating after each addition, and afterwards add, in the same manner, 37.5 mls of distilled water. Mix the purified tale intimately with the liquid, and then filter through a wetted filter, returning the first portion of the filtrate until a transparent liquid is obtained. Lastly, wash the filter with a mixture of 1 volume of alcohol and three volumes of distilled water, until the product measures 100 mls.

GLYCERITA—GLYCERITES

These are solutions or mixtures of drugs in glycerin. Most of them are solutions, but one, Glyceritum Amyli is a semi-solid mass. They are nice preparations, and are usually employed externally. The following five are official:

Glyceritum Acidi Tannici—	Glycerite of Tannic Acid
“ Amyli	“ “ Starch
“ Boroglycerini	“ “ Boroglycerin
“ Hydrastis	“ “ Hydrastis
“ Phenolis	“ “ Phenol.

GLYCERITUM ACIDI TANNICI

R	
Tannic Acid	5.0 Gm.
Glycerine	20.0 Gm.
to make	25.0 Gm.

Weigh the glycerin into a tared, wide-mouthed bottle with a capacity of about 60.0 mls. Place the bottle and contents in a water bath, heat the water until it boils, and continue to heat for a few minutes; add the tannic acid to the hot glycerin in small successive portions, agitate the mixture until the tannic acid is dissolved and strain the solution while warm through purified cotton.

Remarks:—This is a 20% solution of tannic acid in glycerin. It is used externally as an astringent protective.

GLYCERITUM PHENOLIS

Liquified Phenol	5.0 mls
Glycerin	20.0 mls

to make 25.0 mls

Add the Liquified Phenol to the Glycerin and thoroughly mix.

Remarks:—This is a 20% solution of Phenol in Glycerin, but is too strong for ordinary use.

COLLODIA—COLLODIONS

These are preparations for external use. Simple collodion is a solution of Pyroxylin in Ether and Alcohol. The others have simple collodion as their base. When applied, the solvent evaporates very rapidly, leaving a film of Gun Cotton which is a good protective. Three are official:

Collodium	Collodion
“ Cantharidatum	Cantharidal Collodion
“ Flexile	Flexible Collodion

COLLODIUM

Pyroxylin	2.0 Gm.
Ether	37.5 mls
Alcohol	12.5 mls

to make about 50.0 mls.

Add the alcohol to the pyroxylin contained in a suitable bottle, shake the mixture thoroughly, then introduce the ether, and again shake the mixture until the pyroxylin is dissolved. Cork the bottle

well and set it aside until the liquid becomes clear. Finally decant the clear portion from any sediment which may have deposited and transfer it to containers which must be well closed. Keep the collodion in a cool place remote from fires.

COLLODIUM FLEXILE—Flexible Collodion.

Collodion	19.0 Gm.
Camphor	0.4 Gm.
Castor Oil	0.6 Gm.
to make	20.0 Gm.

Weigh the ingredients successively, into a tared bottle, and shake the mixture until the camphor is dissolved. Keep the product as in case of collodion.

Remarks:—This is the preparation mostly used because collodion is brittle and the film is liable to crack when applied to joints or other movable parts.

OLEATA—OLEATES

These were formerly defined as solutions of oxides or alkaloids in oleic acid but in the revision of the Pharmacopoeia of 1910 but one is official, “Oleatum Hydrargyri”—so that oleate would be defined as a solution of an oxide in oleic acid. Oleates are applied by inunction and depend upon absorption from the skin for their physiological action. As stated above they are prepared by dissolving an oxide or an alkaloid in oleic acid. An excess of heat should be avoided in making metallic oleates, as the acid easily reduces the metals, especially when heated.

OLEATUM HYDRARGYRI—Oleate of Mercury.

Yellow Mercuric Oxide, in very fine powder	5.0 Gm.
Alcohol	4.0 mls
Oleic Acid, a quantity sufficient	
to make	20 Gm.

Mix the yellow mercuric oxide with the alcohol in a tared mortar; add 15 grams of oleic acid, warm the mixture to a tempera-

ture, not to exceed 50° C., stir constantly for 5 minutes, and then continue to heat, stirring frequently, until the alcohol is expelled and the mercuric oxide is dissolved, now add sufficient oleic acid to make the product weigh 20.0 grams and mix thoroughly. Avoid contact with metallic instruments; preserve the oleate in tightly stoppered bottles.

Remarks:—This is the only official oleate of the Pharmacopoeia. The others were dropped at the last revision.

CHAPTER X.

INFUSA—INFUSIONS

These are preparations of vegetable drugs made by maceration or percolation. In the one official infusion, Infusum Digitalis,, and the general formula for making infusions, the water is poured on while boiling hot. Cold water should be used for those drugs whose active principle would be driven off or its formation prevented by boiling water.

The following general formula is given for the preparation of infusions:

INFUSUM—INFUSION

The substance coarsely comminuted	50.0 Gm.
Water, a sufficient quantity	
to make	1000.0 mls

Put the substance into a suitable vessel provided with a cover. Pour upon it 1000 mls of boiling water, cover tightly and let steam one-half hour in a warm place. Then strain with expression and pass enough water through to make the infusion measure 1000 mls.

INFUSUM DIGITALIS—Infusion of Digitalis

Digitalis, bruised	1.5 Gm.
Cinnamon Water	15.0 mls
Water, a sufficient quantity	
to make	100.0 mls

Pour 50 mls of boiling water upon the digitalis contained in a suitable vessel and allow it to macerate for one hour. Then strain; add the cinnamon water to the strained liquid and pass enough water through the residue on the strainer to make the product measure 100.0 mls. Mix well.

Infusion of digitalis must be freshly prepared from the *leaves*.

DECOCTA—DECOCTIONS

Decoctions are liquids made by boiling the drug in closed vessels for fifteen minutes. They are then allowed to cool, strained and water added to make up the required amount. There are no official decoctions but the Pharmacopoeia includes a general formula for their preparation. Decoctions and infusions do not keep well and should be freshly prepared for use.

DECOCTION

The substance coarsely comminuted	50. Gms.
Water, a sufficient quantity	
to make	1000. mls

Put the substance in a suitable container provided with a cover. Pour upon it 1000 mls of cold water, cover it well and boil for 15 minutes. Then let cool to about 40°C., express, strain the expressed liquid and pass enough cold water through the strainer to make the product measure 1000.0 mls.

DECOCTUM CETRARIA

Cetraria	5.0 Gm.
Water, a sufficient quantity	
to make	100.0 mls

Cover the cetraria in a suitable vessel with 40 mls of cold water, express after an hour and throw the liquid away. Then boil the cetraria with 100.0 mls of water for half an hour, strain and pass enough cold water through the strainer to make the product measure 100.0 mls.

TINCTURAE—TINCTURES

Tinctures are alcoholic solutions of non-volatile substances obtained by the extraction of drugs. *Tincture of iodine* is an exception to the rule of non-volatile substances, while *both tincture of iodine and tincture of the chloride of iron* are made by solution. They differ from spirits in that, with the exception of tincture of iodine, the substances from which they are prepared are non-volatile. They differ from fluidextracts in respect to strength. They are weaker than fluidextracts and not uniform in strength, except that the potent tinctures are ten per cent. strength of the drug. Tinctures may be prepared by maceration, percolation, and solution or dilution.

The Pharmacopoeia states that unless otherwise directed in the text, tinctures shall be made by one of two processes—Type P, Percolation and Type M, Maceration.

TYPE PROCESSES FOR TINCTURES

Type Process P—Percolation

Moisten the powdered drug or mixed drugs as designated in the formula with a sufficient quantity of the prescribed menstruum to render it evenly and distinctly damp, transfer it to a percolator, and, without pressing the powder, allow it to stand well covered for six hours; then pack it firmly, unless otherwise directed, and pour on enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for twenty-four hours. Then allow the percolation to proceed slowly, gradually adding sufficient of the menstruum to make one thousand mls of the finished tincture.

Type Process M—Maceration.

Macerate the drug or mixed drugs designated in the formula in a stoppered container, in a moderately warm place, with seven hundred and fifty mls of the prescribed solvent (unless a different amount is specified in the formula). Continue the maceration with frequent agitation during three days or until the drug is practically extracted, transfer the mixture to a filter and, when the liquid has drained off completely, gradually wash the residue on

the filter with enough of the solvent to make one thousand mils of finished tincture.

There are 54 official tinctures. The following table gives a list of official tinctures together with method of preparation and menstruum employed :

BY SOLUTION OR DILUTION

PREPARATION	SOLVENT
Tinctura Ferri Chloridi	Alcohol 650 mils
	Sol. of Ferric Chloride 350 mils
Tinctura Iodi	Alcohol 950, Water 50

MACERATION TYPE M.

MENSTRUUM	PREPARATION
Alcohol, U. S. P.	Tinctura Asafoetidae
	“ Aurantii Dulcis
	“ Benzoini
	“ Benzoini Composita
	“ Guaiaci
	“ Limonis Corticis
	“ Myrrhae
	“ Tolutana
Alcohol 750 mils, Water 250 mils	“ Lavendulae Composita
	“ Scillae
Diluted Alcohol	“ Aloes
	“ Gambir Composita
	“ Moschi
Boiling water 500	
Alcohol 500 mils	“ Kino
Glycerin 50 mils	
Diluted Alcohol 950 mils	“ Cardamomi Composita
Glycerin 40 mils, Diluted	“ Opii Camphorata
Alcohol 950 mils	/
Aromatic Spirits of Ammonia	“ Guaiaci Ammoniata

Of the above, squill is made by maceration and expression.

MADE BY PERCOLATION TYPE P.

MENSTRUUM	PREPARATION
Alcohol, U. S. P.	Tinctura Cannabis
	“ Cantharidis
	“ Physostigmatis
	“ Pyrethri
	“ Strophanthi
	“ Veratri Viridis
	“ Zingiberis
Alcohol 950 mils, Water 50 mils	“ Capsici
Alcohol 750 mils, Water 250 mils	“ Nucis Vomicae
	“ Valerianae
	“ Digitalis
Alcohol 700 mils, Water 300 mils	“ Aconiti
Alcohol 650 mils, Water 350 mils	“ Gelsemii
Alcohol 666 mils, Water 333 mils	“ Hydratis
Alcohol 600 mils, Water 400 mils	“ Aurantii Amari
	“ Calumbae
	“ Colchici Seminis
Glycerin 100 mils, Alcohol 500 mils, Water 400 mils	“ Gentianae Composita
Diluted Alcohol	“ Arnicae
	“ Belladonnae Foliorum
	“ Cardamomi
	“ Hyoscyami
	“ Lobeliae
	“ Opii
	“ Stramonii
Alcohol 333 mils, Water 666 mils	“ Quassiae
Alcohol 200 mils, Water 800 mils	“ Opii Deodorata
Glycerin 75 mils, Alcohol 675 mils, Water 250 mils	“ Cinchonae
	“ Cinchonae Composita
	“ Cinnamomi
Glycerin 250 mils, Alcohol 500 mils, Water 250 mils	“ Lactucarii
Glycerin 100 mils, Alcohol 500 mils, Water 400 mils	“ Rhei
	“ Rhei Aromatica
Hydrochloric acid 10 mils, Al- cohol 600 mils, Water 400 mils	“ Sanguinariae
Aromatic Spirits of Ammonia	“ Valerianae Ammoniata

TINCTURA IODI—Solution

Iodine	3.5 Gm.
Potassium Iodide	2.5 Gm.
Distilled water	3.5 mls
Alcohol, a sufficient quantity	

to make 50.0 mls

Dissolve the potassium iodide in the distilled water contained in a bottle graduated to 100.0 mls; add the iodine and agitate the mixture until solution is affected. Then add sufficient alcohol to make 50 mls of Tincture and mix thoroughly.

TINCTURA ALOES—Maceration

Purified Aloes, in No. 40 powder	10.0 Gm.
Glycyrrhiza, in No. 40 powder	20.0 Gm.

to make 100.0 mls

Prepare a tincture by the Type Process M, using diluted alcohol as a solvent.

TINCTURA ZINGIBERIS—Tincture of Ginger

Jamaica Ginger, in No. 30 powder	20.0 Gm.
----------------------------------	----------

to make 100.0 mls

Prepare a tincture by the Type Process P, using alcohol as the menstruum.

FLUIDEXTRACTA—FLUIDEXTRACTS

Fluidextracts are concentrated liquid preparations of vegetable drugs, containing alcohol either as a solvent or preservative and bearing a uniform relation to the drug used so that one mil of the fluidextract closely represents the activity of one gram of the air dried powdered drug of standard quality. They possess the following advantages over tinctures: 1. They have a definite strength, representing 100% of the activity of the crude drug, consequently the dose is the same as for the crude drug and need not

be especially remembered. 2. They are so concentrated that less is required for action, and 3. They keep better than tinctures and some improve with age.

With few exceptions, the fluidextracts of the Pharmacopoeia may be classified according to the menstrua used in the extraction of the drugs and the process of manufacture employed, but there are several drugs which require special manipulation to make satisfactory preparations and for them definite formulas have been devised and are printed in full in the text. The formulas for the other fluidextracts correspond to one of the following types:

Type Process A. In this class are included those fluidextracts that are made with a menstruum of alcohol or a mixture of alcohol and water by the usual process of percolation.

Type Process B. In this group are included those fluidextracts in which glycerin or an acid is used in the extraction and two menstrua are successively employed. The first menstruum contains the acid or glycerin in definite proportion to the amount of drug while the second consists of a mixture of alcohol and water intended for completing the exhaustion of the drug.

Type Process C. This is the process of fractional or divided percolation (repercolation). It is especially recommended for drugs containing volatile ingredients, or constituents injured by heat, but may be used as an alternative process in the formulas in which Type Process A. is directed.

Type Process D. In this class are included those fluidextracts in which extraction is effected by infusion and percolation with boiling water, alcohol being added to the concentrated liquid as a preservative.

In the preparation of fluidextracts by either process, A, B, or C the rate of percolation must be perfectly controlled and, for the quantities directed in the formulas of the Pharmacopoeia, (1000.0 Gms.) the rate of flow should not exceed ten drops per minute, until the reserved percolate is collected and twenty drops per minute thereafter.

DIRECTIONS FOR THE DIFFERENT TYPE PROCESSES.

Type Process A. Moisten required amount of the powdered drug with a sufficient amount of the prescribed menstruum to ren-

der it evenly and distinctly damp and to maintain it so, after macerating for six hours in a tightly covered container. Then pack it in a cylindrical percolator and add enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding more menstruum until the drug is exhausted. Reserve the first eight hundred and fifty mls of the percolate (unless otherwise specified in the formula); recover the alcohol from the remainder and concentrate the residue to a soft extract at a temperature not exceeding $60^{\circ}\text{C}.$; dissolve this in the reserved portion, mix thoroughly, and finally add a sufficient quantity of the menstruum to obtain one thousand mls or the volume determined by calculation or directions.

Type Process B. Moisten one thousand grams of the powdered drug directed with a sufficient quantity of the prescribed Menstruum I, to render it evenly and distinctly damp and to maintain it so after maceration for six hours in a tightly covered container. Then pack it in a cylindrical percolator, add the remainder of Menstruum I, and when this has just disappeared from the surface, gradually add Menstruum II, constantly maintaining a stratum of liquid above the drug.

When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours, and then allow the percolation to proceed slowly, gradually adding Menstruum II until the drug is exhausted. Reserve the first eight hundred and fifty mls of the percolate (unless otherwise directed in the formula): recover the alcohol from the remainder and concentrate the residue to a soft extract at a temperature not exceeding $60^{\circ}\text{C}.$; dissolve this in the reserved portion, mix thoroughly, and finally add a sufficient quantity of Menstruum II to obtain one thousand mls, or the volume determined by calculation from assay.

Type Process C. Divide one thousand grams of the powdered drug directed into three portions of five hundred grams, three hundred grams, and two hundred grams, respectively. Moisten the first portion of the drug (500 Gms.) with a sufficient quantity

of the prescribed menstruum to render it evenly and distinctly damp and to maintain it so after maceration for six hours in a tightly-covered container. Then pack it in a cylindrical percolator and add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours and then allow the percolation to proceed slowly, gradually adding more menstruum. Reserve the first two hundred mls of the percolate and continue the process until the additional percolate measures fifteen hundred mls, the latter being collected in successive portions of three hundred mls each.

Moisten the second portion of the powdered drug (300 Gm.) with a sufficient quantity of the percolate collected in the preceding operation immediately after the reserved portion, to render it evenly and distinctly damp and to maintain it so after macerating for six hours in a tightly-covered container. Then pack it in a cylindrical percolator and macerate and percolate as directed for the first part of the drug, using as menstruum the several portions of percolate from the preceding operation in the order in which they have been collected, and, if this be insufficient, follow with some of the original menstruum. Reserve the first three hundred mls of percolate and continue the process until the additional percolate measures eight hundred mls, collecting the weaker percolate in successive portions of two hundred mls each.

Moisten the third portion of the powdered drug (200 Gm.) with a sufficient quantity of the percolate collected in the preceding operation immediately after the reserved portion, to render it evenly and distinctly damp and to maintain it so after macerating for six hours in a tightly-covered container. Then pack it in a cylindrical percolator and macerate and percolate as before, using as menstruum the several portions of the percolate from the preceding operation in the order in which they have been collected, and, if this be insufficient, follow with more of the original menstruum. Collect five hundred mls of percolate and mix this with the two portions previously reserved so as to make one thousand mls of finished fluidextract.

When Type Process C is directed for fluidextracts which are adjusted by assay to a definite alkaloidal standard, collect only four hundred and twenty mls of percolate from the third portion of the drug instead of the five hundred mls as directed above. Mix this percolate with the two portions previously reserved, assay a portion of the mixture and then adjust its volume, by the addition of the menstruum directed, so that each one hundred mls of finished fluidextract will contain the prescribed amount of alkaloid.

Type Process D. To one thousand grams of the ground drug add five thousand mls of boiling water, mix thoroughly and allow it to macerate in a covered container for two hours in a warm place. Then transfer the moist drug to a tinned or enameled metallic percolator and allow percolation to proceed, gradually adding boiling water until the drug is exhausted. Evaporate the percolate on a water bath or steam bath to the volume specified, and when cold add the alcohol directed and mix thoroughly.

In making the following fluidextracts, calculate for 100.0 grams instead of 1000.0 grams.

FLUIDEXTRACTUM ZINGIBERIS

Jamaica Ginger, in No. 40 powder 100.0 Gm.

Prepare a fluidextract by Type Process A, using alcohol as the menstruum.

FLUIDEXTRACTUM TARAXACI

Taraxacum, in No. 30 powder 100.0 Gm.

Prepare a fluidextract by Type Process B, using a mixture of ten mls of glycerin, fifty mls of alcohol and forty mls of water as Menstruum I, and diluted alcohol as Menstruum II.

FLUIDEXTRACTUM GENTIANAE

Gentian, in No. 30 powder 100.0 Gm.

Prepare a fluidextract by Type Process A, using diluted alcohol as the Menstruum.

VINI—WINES

Wines are liquid preparations containing the soluble principles of medicine substances, dissolved in wine. They may be prepared by solution or maceration, and differ from tinctures only in

the solvent employed, i. e., wine instead of alcohol in various strengths. Ten were official in the Pharmacopoeia of 1900 but they were all dropped from the last revision.

VINUM COLCHICI SEMINIS

Fluidextract of Colchicum Seed	5.0 mls
Alcohol	5.5 mls
White Wine	35.5 mls

to make 50.0 c.c.

Mix them. Set the mixture aside for two days; then filter through paper in a well covered funnel.

OLEORESINAE—OLEORESINS

The pharmaceutic oleoresins are liquid preparations consisting principally of volatile oils and resins, obtained by the extraction from vegetable drugs by percolation with ether or alcohol and subsequent distillation or evaporation of the solvent from the dissolved portions. There are two groups of oleoresins, the natural and the pharmaceutic. The former are mixtures of volatile oils and resins which exude from plants. (Turpentine, Copaiba). They are quite different from the pharmaceutic class described above. Oleoresins are the *most concentrated* of all liquid preparations of drugs. Their strength varies, however, but usually runs from 5 to 10 times the strength of the crude drug.

Preparation: With slight differences they are prepared in a manner similar to fluidextracts. They are placed in a percolator without moistening, the menstruum is usually different, and a special percolator for volatile liquids should be used for the best results. The following 6 are official:

	{	Oleoresina Aspidii	Oleoresin of Aspidium
Solvent	{	“ Capsici	“ Capsicum
Ether	{	“ Petroselinii	“ Parsley Fruit
	{	“ Piperis	“ Pepper
	{	“ Zingiberis	“ Ginger
Solvent	{	“ Cubebae	“ Cubebs
Alcohol	{		

OLEORESINA ASPIDII

Aspidium, recently reduced to No. 40 powder, 50.0 Gm.

Ether, a sufficient quantity.

Place the aspidium in a cylindrical glass percolator provided with a stop-cock, and arranged with a cover and a receptacle suitable for volatile liquids. Pack the powder firmly, and percolate slowly with ether, added in successive portions, until the aspidium is exhausted. Recover the greater part of the ether from the percolate by distillation on a water bath, and having transferred the residue to a dish, allow the remaining ether to evaporate spontaneously in a warm place. Keep the oleoresin in well stoppered bottles.

Note: The Oleoresin of Aspidium usually deposits on standing, a granular crystalline substance. This should be thoroughly mixed with the fluid portion before use.

ACETA—VINEGARS

These are liquid preparations of the active principles of drugs, prepared by extraction with *Diluted Acetic Acid*. They resemble tinctures except for the solvent used. The Acetic Acid is a good solvent for many of the active ingredients of plants and serves as a preservative. It also produces soluble salts with the alkaloidal principles of plants. But one is official.

Acetum Scillae, Vinegar of Squill

This is prepared with Diluted Acetic Acid (6% by weight of absolute Acetic Acid), and is made by maceration. It represents 10 per cent. of the active drug.

ACETUM SCILLAE

R

Squill, in No. 20 powder 5.0 Gm.

Diluted Acetic Acid, a sufficient quantity

to make 50.0 mls

Macerate the squill with 45 mls of diluted acetic acid during seven days, with frequent agitation; then strain through muslin and wash the mass on the strainer with enough diluted acetic acid to make the strained liquid measure nearly 50 mls. Heat this liquid to boiling, filter while hot, and when cold, add sufficient diluted acetic acid to make the product measure fifty mls.

EXTRACTA—EXTRACTS

Extracts are solid or semi-solid preparations of the active constituents of drugs prepared by the percolation of the crude drug with the proper menstruum and evaporation of the percolate. The menstruum may be water, alcohol, or various proportions of water and alcohol, or ammonia and extracts made from such a percolate are termed respectively, *aqueous*, *alcoholic*, *hydro-alcoholic*, or *ammoniated* extracts. Besides the above the juices of fresh plants, extracted by contusion and expression are often evaporated and known as “inspissated juices”. These are popular in England but none are official in this country. There are 25 official extracts. As a rule the extracts are not so satisfactory as the fluidextracts or tinctures because they vary in strength, the dose is exceedingly small and the soft ones are difficult to manipulate.

TABLE OF EXTRACTS

Extractum	Aconiti	Powdered
“	Belladonnae Foliorum	Powdered and Pilular
“	Cannabis	Pilular
“	Cascaræ	Powdered
“	Cimicifugæ	Powdered
“	Colchici Cormi	Powdered
“	Colocynthis	Powdered
“	Colocynthis compositum	Powdered
“	Ergotæ	Pilular
“	Fellis Bovis	Powdered
“	Gelsemii	Powdered
“	Gentianæ	Pilular
“	Glycyrrhizæ	Brittle
“	Glycyrrhizæ Purum	Pilular
“	Hydrastis	Powdered
“	Hyoscyami	Pilular
“	Malti	Thin Liquid
“	Nucis Vomicae	Powdered
“	Opii	Powdered
“	Physostigmatis	Powdered
“	Rhei	Powdered
“	Stramonii	Powdered and Pilular
“	Sumbul	Pilular
“	Taraxaci	Pilular
“	Viburni Prunifolii	Powdered

Make EXTRACTUM GENTIANAE—Extract of Gentian

Gentian in No. 20 powder	50.0 Gm.
Water, a sufficient quantity	

Moisten the powder with sufficient water and allow it to stand (macerate) for 24 hours. Then pack it in a cylindrical percolator and gradually pour water upon it until the drug is exhausted. Reduce the liquid to three-fourths of its bulk by boiling and strain: then by means of a water bath, evaporate to a pilular consistency.

EXTRACTUM RHEI—Extract of Rhubarb

Rhubarb, in No. 40 Powder	100.0 Gm.
Magnesium Oxide	5.0 Gm.
Starch, dried at 100°C.	
Alcohol,	
Water, each, a sufficient quantity	

to make 50.0 Gm.

Moisten the drug with sufficient of a mixture of four volumes of alcohol to one volume of water, pack it in a cylindrical percolator and add enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding menstruum of the same proportion of alcohol and water as before until the drug is exhausted. Recover the alcohol from the percolate by distillation at as low a temperature as practicable, and continue distillation until a residue of syrupy consistency remains in the still. Transfer this to a shallow dish, rinse the still with a little warm menstruum, add the rinsings to the residue in the dish, and evaporate the mixture to dryness, with frequent stirring, at a temperature not exceeding 70°C. Weigh the dry extract and add the magnesium oxide and sufficient of the dried starch to make the product weigh fifty grams.

Reduce the mixture to a fine powder, mix thoroughly, pass the extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

RESINAE—RESINS

Resins are chemically solid plant substances or exudations usually acid in character, insoluble in water but soluble in water and an alkali. However, the pharmaceutic class—resins—are those plant substances insoluble in water, soluble in alcohol, obtained either as a residue left after the distillation of an oleoresin or by precipitating them by pouring a concentrated alcoholic extract of the drug into water or acidulated water. All official resins except rosin are obtained in this way. Four are official:

Resina	Rosin
Resina Jalapae	Resin of Jalap
“ Podophylli	“ “ Podophyllum
“ Scammoniae	“ “ Scammony

RESINA JALAPAE—Jalap

R

Jalap, in No. 60 powder 50.0 Gm.

Alcohol

Water, each, a sufficient quantity

Moisten the powder with 25 mls of alcohol and pack it firmly in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding alcohol, (until 250 mls of percolate are obtained) or until the percolate ceases to produce more than a slight turbidity when dropped into water. Distil off the alcohol, by means of a water-bath, until the percolate is reduced by weight to 12.5 grams, and add the latter slowly, with constant stirring, to 150 mls of water. When the precipitate has subsided, decant the supernatant liquid, and wash the precipitate twice, by decantation with fresh portions of hot water. After having drained off the liquid, transfer the Resin to a porcelain dish and heat it to dryness on a water-bath.

Description:—Yellow to brown masses or fragments, breaking with a resinous, glossy fracture, translucent at the edge, or a yellowish-brown powder, having a slight peculiar odor, and a somewhat acrid taste.

LINIMENTA—LINIMENTS

Liniments are liquid preparations for external use to be applied by friction. They are usually solutions or mixtures of oily or alcoholic substances containing fatty oils. Some official liniments are solid or semisolid preparations. Eight liniments are official. Three have a fixed oil as a base, three alcohol, one turpentine, and one a fluidextract. The following table indicates the base in each:

<i>Alcoholic</i> —Basis	Alcohol	Linimentum	Saponis, Soap Liniment
	“	“	Mollis
	“ Soap Liniment	“	Chloroformi
	“ Fluidextract	“	Belladonnae
<i>Oleaginous</i> —Basis	Cotton Seed Oil	“	Camphorae
	“ Linseed Oil	“	Calcei
	“ Sesame Oil	“	Ammoniae
	“ Turpentine Oil	“	Terebinthinae

LINIMENTUM SAPONIS—Soap Liniment. liquid Opodeldœ

Soap, dried and granulated or powdered	6.0 Gm.
Camphor, in small pieces	4.5 Gm.
Oil of Rosmary	1.0 mil
Alcohol	70.0 mils
Water, a sufficient quantity	

to make 100.0 mils

Dissolve the camphor and the oil of rosmarj in the alcohol, add the soap and sufficient water to make the product measure 100.0 mils. Agitate the mixture until the soap is dissolved. Set it aside in a cool place for 24 hours, then filter.

LINIMENTUM CHLOROFORMI

Chloroform	15.0 mils
Soap Liniment	35.0 mils

to make 50.0 mils

Mix them by agitation.

LINIMENTUM AMMONIAE

Ammonia Water	25.0 mls
Sesame Oil	75.0 mls

to make 100.0 mls

Agitate the ammonia water with the sesame oil until a uniform mixture is obtained.

LINIMENTUM CAMPHORAE

Camphor, in coarse powder	5.0 Gm.
Cotton Seed Oil	20.0 mls

to make 25.0 mls

Introduce the cotton seed oil into a suitable flask and heat it on a water bath. Introduce the camphor, and stopper the container securely. Dissolve the camphor by agitation without the further application of heat.

LINIMENTUM CALCIS—Carron oil.

Lime water	25.0 mls
Linseed oil	25.0 mls

to make 50.0 mls

Mix them by agitation.

PULVERES—POWDERS

These are preparations of, or combinations of, solid drugs in a fine state of division, for external or internal use. See pp. 26. The pulverization is done to facilitate solution of the ingredients. Seven are official:

Pulvis Aromaticus	Aromatic powder
“ Cretae Compositus	Compound chalk powder
“ Effervescens Compositus	“ Effervescing Powder
“ Glycyrrhizae Compositus	“ Licorice powder
“ Ipecacuanhae et Opii	Dover’s powder
“ Jalapae Compositus	Compound powder of jalap
“ Rhei	Compound powder of rhubarb

PULVIS CRETAE COMPOSITUS

Prepared Chalk	6.0 Gm.
Acacia, in fine powder	4.0 Gm.
Sugar, in fine powder	10.0 Gm.

Mix the powder thoroughly by trituration and pass the product through a No. 60 sieve.

PULVIS EFFERVESCENS COMPOSITUS—Seidlitz Powder

Sodium Bicarbonate, dried and in fine powder	2.5 Gm.
Potassium and Sodium Tartrate in fine powder	7.5 Gm.
Tartaric Acid, in fine powder	2.3 Gm.

Mix the sodium bicarbonate intimately with the potassium and sodium tartrate, and wrap in a blue paper.

Wrap the tartaric acid in a separate white paper.

Keep the powders well closed, in a dry place.

These powders as commonly called "Seidlitz Powders". They are of much use in human practice as a purgative. The two powders are to be dissolved in a glass of water and drunk while the gas is being evolved. The tartaric acid acting upon the sodium bicarbonate liberates carbonic acid gas and causes the effervescence.

TRITURATIONES—TRITURATIONS

These preparations were suggested by similar preparations used in homeopathy. The general formula for triturations as directed by the Pharmacopoeia is,

Substance	10.0 Gm.
Sugar of Milk	90.0 Gm.

Weigh the substance and the sugar of milk separately; then place the substance, previously reduced if necessary to a moderately fine powder, in a mortar; add about an equal measure of sugar of milk, mix well by means of a spatula and triturate the powders thoroughly together. Then add fresh portions of sugar of milk, from time to time, until the whole is added, and continue the trituration after each addition until the substance is intimately mixed with the sugar of milk and reduced to a fine powder.

TRITURATIO ELATERINI

Elaterin	1.0 Gm.
Sugar of Milk	9.0 Gm.

Mix them thoroughly by trituration. (See above).

MASSA—MASSES

These are combinations of medical substances, incorporated with enough liquid to make a consistency for pills. Two are official.

Massa Ferri Carbonatis	Vallet's Mass
Massa Hydrargyri	Blue Mass

MASSA HYDRARGYRI—Blue Mass

Mercury	16.5 Gm.
Oleate of Mercury	0.5 Gm.
Glycyrrhiza, in No. 60 powder	5.0 Gm.
Althæa, in No. 60 powder	7.5 Gm.
Glycerin	4.5 Gm.
Honey of Rose	16.0 Gm.

to make 50.0 Gm.

Triturate the oleate of mercury in a warm mortar, gradually add the mercury, then introduce a small amount of honey of rose and triturate the mixture until globules of mercury are no longer visible under a lens magnifying ten diameters. Now incorporate the remainder of the honey of rose and the glycerin, then gradually add the glycyrrhiza and the althæa and continue the trituration until the mass is homogeneous.

Remarks:—The above is known as “Blue Mass”. Its manufacture requires skill and labor as the mercury tends to run together and form globules. This is prevented by triturating with honey of rose, so as to coat each small globule, and then adding the other ingredients. It should be finished in one-half hour.

CONFECTIONS

Confections are soft, solid saccharine preparations in which the medicinal agent is combined with saccharine substances, as jellies, pulp of fruit or honey. They are also called conserves or

electuaries. In the early days of medicines they served as a useful means of administering medicine because at that time most drugs were disagreeable if not nauseating. They were used a great deal in ancient times. One of them which gained considerable fame was the "Confection of Damocratis" which contained 40 or 50 ingredients. Confections are rarely used in Veterinary Medicine as such but as electuaries which will be discussed at greater length under the head of unofficial preparations. There are no official confections.

CONFECTION ROSAE

Red Rose, in No. 60 powder	4.0 Gms.
Sugar, in fine powder	32.0 Gms.
Clarified Honey	6.0 Gms.
Stronger Rose Water	8.0 mls

Rub the Red Rose with the Stronger Rose Water, previously heated to 65°C. Then gradually add the Clarified Honey and the sugar and beat the whole together until a uniform mass results.

PILULAE—PILLS

Pills are small globules, spherical or lenticular in shape, containing one dose of medicinal substance and intended to be swallowed whole. Since they are so easily made by machinery, but few are now made by hand. There are three steps in the manufacture of pills.

1. Making the mass,
2. Dividing the mass,
3. Rolling the pills.

After they are rolled, they may be coated with gelatin, sugar, chocolate, keratin, etc.

Seven are official:

Pilulae Aloes—	Aloes Pills
“ Asafoetidae	Asafoetida Pills
“ Catharticae Compositae	Compound Cathartic Pills
“ Ferri Carbonatis	Blaud's Pills
“ Ferri Iodidi	Iodide of Iron Pills
“ Phosphori	Phosphorus Pills
“ Rhei Compositae	Compound Rhubarb Pills

PILULAE ALOES

R

Aloes, in fine powder	1.3 Gm.
Soap, in fine powder	1.3 Gm.
Water, sufficient quantity	

to make 10 pills

Mix the powders intimately, then incorporate sufficient water to make a mass, and divide into ten pills.

PILULAE RHEI COMPOSITAE

R

Rhubarb, in No. 80 powder	1.3 Gms.
Aloes, in fine powder	1.0 Gm.
Myrrh, in fine powder	0.6 Gm.s
Oil of Peppermint	0.05 mils (about 1 drop)
Water, a sufficient quantity	

to make 10 pills

Mix the Oil of Peppermint intimately with the powders, then incorporate sufficient water to form a mass; divide it into 10 pills.

TROCHISCI—TROCHES

These are disc-like masses of medicinal substances, consisting chiefly of medical powders, sugar and mucilage, intended to be slowly dissolved in the mouth. Powerful or disagreeable drugs should not be given in this manner, and it is needless to say that they cannot be used in veterinary medicine. They may be manufactured by massing or compression. In the former case the medicine is combined with some mucilaginous substance with sufficient water to make a mass, and then worked in a mortar to a mass. This is rolled out and then cut with a lozenge cutter.

By compression:—The manufacture of troches by compression differs from that of tablets only by the size of the mold. Five are official;

Trochisci Acidi Tannici	Troches Tannic Acid
“ Ammonii Chloridi	“ Ammonium Chloride
“ Cubebae	“ Cubebs
“ Potassii Chloratis	“ Potassium Chlorate
“ Sodii Bicarbonatis	“ Sodium Bicarbonate

TROCHISCI POTASSII CHLORATIS

Potassium Chlorate, in fine powder	1.5 Gm.
Sugar, in fine powder	6.0 Gm.
Tragacanth, in fine powder	0.3 Gm.
Water, a sufficient quality	

to make 10.0 troches

Mix the sugar with the tragacanth by trituration in a mortar; then transfer the mixture to a sheet of paper, and by means of a bone or wooden spatula mix it with the potassium chlorate, being careful to avoid unnecessary trituration or pressure which might cause the mixture to ignite or explode. Lastly with water, form a mass, to be divided into ten (10) troches.

UNGUENTA—OINTMENTS

Ointments are semisolid preparations in which the medical substances are blended with fatty substances, lard, petrolatum, etc., and soft enough to be applied to the skin by inunction. They are always softer than cerates, which see. They may be prepared by incorporation or fusion. When made by the former method, the medical substance is rubbed with the solid fatty matter in a mortar or upon an ointment slab with a spatula. When made by fusion the fatty base is liquified by gentle heat and the medicine incorporated while liquid or after solidification. Twenty are official.

Unguentum, A base for other ointments

Unguentum Acidi Borici
“ Acidi Tannici
“ Aquae Rosae
“ Belladonnae
“ Chrysarobini (Chrysarobin)
“ Diachylon

“	Gallae (Nutmalls)
“	Hydrargyri
“	Hydrargyri Ammoniati
“	Hydrargyri Dilutum (Blue ointment)
“	Hydrargyri Nitratis
“	Hydrargyri Oxidi Flavi
“	Iodi
“	Iodoformi
“	Phenolis
“	Picis Liquidæ
“	Stramonii
“	Sulphuris
“	Zinci Oxidi

ADEPS BENZOINATUS—Benzoinated Lard

Lard	100.0 Gm.
Siam Benzoin	1.0 Gm.

Add the benzoin to the lard and mix thoroughly; then melt the mixture by means of a water bath, and, stirring frequently, continue the heat for two hours, covering the vessel and not allowing the temperature to rise about 60°C. (140°F.) Lastly strain the liquid through muslin and stir occasionally while it cools. Preserve it in a cool place in well closed containers which are impervious to fat.

UNGUENTUM HYDRARGYRI IODIDI RUBRI ET CANTHARIDES

Red Iodide of Mercury	10.0 Gm.
Cantharides, in fine powder	10.0 Gm.
Benzoinated Lard	50.0 Gm.

Triturate the red iodide of mercury in a mortar until all lumps are reduced to a fine powder, add the cantharides, a little at a time and mix the two substances thoroughly. Finally add the benzoinated lard and rub in the mortar until completely mixed.

*Remarks:—*This is a very popular blister for spavins, etc.

UNGUENTUM SULPHURIS ALKALINUM N. F.

Washed Sulphur	10.0 Gm.
Potassium Carbonate	5.0 Gm.
Water	2.5 mls
Benzoinated Lard	32.5 Gm.

Rub the sulphur with the potassium carbonate and water. Gradually add the benzoinated lard and mix thoroughly.

UNGUENTUM ZINCI OXIDI

Zinc Oxide, in fine powder	20.0 Gm.
Benzoinated Lard	80.0 Gm.

Rub the zinc oxide, which must be free from gritty particles, with about one fourth of the melted benzoinated lard, in a previously warmed container and with this incorporate the remainder of the benzoinated lard, previously melted. If necessary, strain the ointment while warm, and stir until it congeals.

UNGUENTUM SULPHURIS

Sublimed Sulphur	15.0 Gm.
Benzoinated Lard	85.0 Gm.

to make 100.0 Gm.

Rub the sublimed sulphur with the benzoinated lard, gradually added, until they are thoroughly mixed.

UNGUENTUM IODI

Iodine	4.0 Gm.
Potassium Iodide	4.0 Gm.
Glycerin	12.0 Gm.
Benzoinated Lard	80.0 Gm.

to make 100.0 Gm.

Triturate the iodine and potassium iodide in a glass mortar with the glycerin until dissolved, then gradually incorporate the benzoinated lard and mix thoroughly. All contact with metallic utensils must be avoided.

This ointment must not be dispensed unless it has been recently prepared.

CERATA—CERATES

These are preparations of medical substances with fats and waxes of such a consistency as to be soft enough to spread upon muslin or other material and not soft enough to liquify when applied to the skin. They are called *Cerates* because they contain wax or *cera*. They may be prepared by fusion or incorporation but all the official ones are directed to be made by the former method, Three are official :

Ceratum	Cerate. Used only as a base
Ceratum Resinae	Resin or Rosin Cerate
Ceratum Cantharidis	Cantharides Cerate

CERATUM RESINAE

Rosin	3.5 Gm.
Yellow Wax	1.5 Gm.
Lard	5.0 Gm.

to make 10.0 Gm.

Melt the rosin, add the yellow wax and lard and continue the heat until liquified. Then strain through muslin. Allow it to congeal with occasional stirring.

In cold weather 5.3 Gm. of lard and 1.2 Gm. of wax may be used.

SUPPOSITORIA—SUPPOSITORIES

Suppositories are solid bodies of various shapes and weights, adapted for the introduction into various orifices of the body, and melting or softening at body temperature. The vehicles usually employed are oil of theobroma, glycerinated gelatin and sodium stearate. The ideal suppository consists of a medicine blended with some inert base which will not liquify at ordinary temperatures but will melt at the body temperature. They may be prepared by three processes, rolling, molding and compression. The first method consists of making a mass, rolling it into a cylinder, cutting the cylinder and shaping with the hands. In case of those made by molds, the mass is liquified and poured into thoroughly chilled molds. By compression the medical substance is mixed with finely grated oil of theobroma and compressed with a lever.



There is one official suppository—Suppositoria Glycerini, besides which the Pharmacopoeia contains general formulas for those made with oil of theobroma and glycerinated gelatin.

SUPPOSITORIA GLYCERINI

Glycerin	15.0 Gm.
Monohydrated Sodium Carbonate	0.25 Gm.
Stearic Acid	1.0 Gm.
Water	2.5 mils

Dissolve the monohydrated sodium carbonate in the water and add it to the glycerin, contained in a suitable vessel placed on a water bath in such a way that the vessel is well down in the boiling water and its contents protected as much as possible from the steam of the bath. Add the stearic acid, and heat the mixture for 15 minutes or until carbon dioxide ceases to be evolved, and the liquid is clear. Then pour the melted mass into suitable molds, remove the suppositories when they are completely cold, and preserve them in a tightly stoppered glass vessel in a cool place.

CATAPLASMA—CATAPLASMS—POULTICES

These are wet masses of solid matter applied to the skin for the purpose of reducing inflammation, or in other cases to act as counter-irritants. The solid matter as the base is chosen with a view to its capacity for absorbing water. Thus the base of the one former official cataplasma is clay, while mucilaginous drugs, such as flaxseed, are valuable for poultice bases.

If the poultice is intended to reduce inflammation, the proper base is one devoid of medical action, and the poultice wet with cold water or liquid acts similarly to a cold compress. If intended to act as a counterirritant, the poultice is either applied hot or is made of some drug which has rubifacient properties. (mustard poultice). Cataplasma Kaolini belongs to the class of mechanical non-medicinal poultices used for allaying inflammation. It was official in the Pharmacopoeia of 1905.

CATAPLASMA KAOLINI or Cataplasma of Kaolin

Koalin, in very fine powder	577.0 Gms.
Boric Acid, in very fine powder	45.0 Gms.
Thymol	0.5 Gms.
Methyl Salicylate	2.0 Gms.
Oil of Peppermint	0.5 Gms.
Glycerin	375.0 Gms.

to make 1000.0 Gms.

Heat the kaolin in a suitable vessel at 100°C., with occasional stirring, for one hour, mix it intimately with the boric acid, and then incorporate the mixture thoroughly with the glycerin; finally add the thymol, which has been dissolved in the methyl salicylate and the oil of peppermint, and make a homogeneous mass. It should be kept in an air tight container.

Remarks:—This preparation is similar to various proprietary preparations which are often prescribed for applications to a large number of inflammatory conditions.

EMPLASTRA—PLASTERS

Plasters are solid preparations containing medicinal substances intended to be applied to the skin, and of sufficient adhesiveness to adhere firmly. They differ from cerates in being free from fats and also from the fact that cerates, when spread on cloth and applied are not of sufficient adhesiveness to stick firmly to the skin. The bases of plasters consist of gum resins, lead plaster, resin plaster, burgundy pitch, isinglass, and India rubber. In former times the first named bases were often used, but the machine made plasters with a rubber base have largely replaced them.

The following are official:

Emplastrum	Belladonnae	—Belladonna Plaster
“	Cantharidis	Cantharides Plaster
“	Capsici	Capsicum Plaster
“	Elasticum	Rubber Plaster
“	Plumbi	Lead Plaster
“	Resinae	Resin or Rosin Plaster
“	Sinipis	Mustard Plaster

EMPLASTRUM PLUMBI—Lead Plaster

Lead Oxide	25.0 Gm.
Olive Oil	25.0 Gm.
Lard	25.0 Gm.

Boiling water, a sufficient quantity.

Heat the olive oil and the lard by gentle heat until liquified in a bright copper or other suitable vessel of a capacity not less than four times the bulk of the ingredients, sift the lead oxide, through a No. 80 sieve, upon the surface of the hot liquid and mix thoroughly. Then gradually add 9 mls of boiling water, and boil the mixture, constantly stirring, with a wooden spatula, and adding sufficient boiling water, from time to time, to replace that lost by evaporation, until the mass is homogeneous and a small portion removed and dipped into cold water is found to be pliable and tenaceous. Then remove it from the fire and wash several times with warm water to remove the glycerin. Finally knead the mass until it is free from water, roll it into cylinders of suitable size, and wrap them in paper.

CHARTAE—PAPERS. Unofficial.

These are a class of preparations in which the medicine is spread upon paper or absorbed by it. But one is official, Charta Sinipis, Mustard Paper. In the U. S. P. of 1890 Charta Potassi Nitratis was also official.

CHARTA POTASSII NITRATIS.

Potassium Nitrate	1.0 Gm.
Distilled Water	4.0 mls

Dissolve the Potassium Nitrate in the water. Soak strips of unsized white paper in the solution and then dry them. The paper should be kept in well closed bottles. This paper was formerly used in asthma by burning it and inhaling the fumes.

CHAPTER XI.

UNOFFICIAL PREPARATIONS

Many unofficial preparations are in so common use that it seems best to include a few of them. The most common are:—

TABELLAE—TABLETS

- Tablet triturates
- Compressed tablets
- Hypodermic tablets

Boli—Bolus, Ball
 Capsules
 Haustus
 Electuary

TABELLAE—TABLETS.

Tablets are small disc-shaped bodies containing medicinal agents. With the exception of *Toxitaellae Hydrargyri Chloridi Corrosivi* they are unofficial but nevertheless largely employed. There are several varieties; tablet triturates, compressed tablets, coated tablets, hypodermic tablets and dispensing tablets.

Tablet triturates are prepared by triturating the medicament with finely powdered sugar of milk if powerful agents are used, or if the substance requires no dilution, triturating it to a very fine powder, moistening the powder with sufficient alcohol or other volatile substance to make a paste. The moistened powder is then pressed into molds consisting of a plate perforated with holes and then pressing out the tablets by fitting this perforated plate over another plate upon which are situated pegs that accurately fit the perforations. The liquid is evaporated very quickly, after which the tablets retain their shape and are ready for use. They possess advantages over any other method of administering solids in human and small animal practice as they are more conveniently administered than powders and are more soluble than pills, compressed tablets or capsules. Well made triturates disintegrate almost immediately on being placed in water.

Hypodermic tablets are made by the same process. The selection of the diluent is an important question because rapid solubility is desired. Dried neutral sodium sulphate has been largely employed and frequently they contain in addition some substance which produces chemical change when added to water and causes a rapid disintegration of the mass.

Tablet Triturates of Calomel. (each contain $1/10$ gr.; 0.006

Calomel	0.6 Gm.
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Sugar of milk, a sufficient quantity	
to make	10.0 Gm.

Clean mold and wipe each hole separately to avoid dirty tablets. Triturate the calomel with 1 gram of sugar of milk. Then add the rest of the sugar of milk in small portions, triturating thoroughly after each addition. Moisten the powder with a few drops of alcohol and with a spatula quickly press into the molds placed upon a pill tile. Then remove and allow to dry.

Compressed tablets are made from dried, granulated materials by compression in a suitable machine. They are less soluble than tablet triturates. Compressed tablets of insoluble material should not be used.

Coated tablets are compressed tablets covered with sugar, chocolate, etc.

Dispensing tablets are those which contain a relatively large amount of the active drug like strychnine 1 gr., or $\frac{1}{2}$ gr. They are used by pharmacists and those who dispense their own remedies in order to avoid the necessity of weighing small amounts of powerful drugs in filling prescriptions.

BOLUS BOLI—Ball

A bolus may be defined as a large pill. The term literally means mass or lump. Its use is restricted to veterinary medicine. They are made very similarly to pills. The ingredients are finely powdered and thoroughly mixed, after which an excipient, such as soap, syrup, glycerin, or molasses is added to make a mass of proper consistency. The mass is then divided into the proper number of doses and each portion is molded into the form of a cylinder with rounded ends. They may be wrapped in thin paper or placed in capsules.

Very few practitioners make their own balls on account of the cheapness at which they may be purchased.

BOLUS ALOES

Aloes	℥ viij	30.0 Gm.
Calomel	gr. xxx	2.0 Gm.
Ginger	℥ j	4.0 Gm.
Nux Vomica	gr. xxx	2.0 Gm.
Glycerin		
Simple syrup aa.	℥ j	4.0 mls

Heat the aloes, glycerin and syrup on a water bath at a temperature not to exceed 120°F., until the aloes is melted, add the ginger and nux vomica and mix thoroughly. Then add about 15 drops of alcohol. Mix and pour upon a plate covered with lycopodium. After the mass has cooled sufficiently mold into shape and wrap in thin paper.

or

Aloes	3 viij
Calomel	gr. xxx
Ginger	3 j
Nux Vomica	gr. xxx
Glycerin	
Simple syrup aa	q. s.

Mix the aloes, ginger, nux vomica and calomel and then add enough of equal parts of simple syrup and glycerin to make a mass. Mold into shape and wrap in thin paper.

CAPSULAE—CAPSULES

Capsules are ovoid or cylindrical shells of gelatin used for the administration of various forms of medicines, powders, masses or liquids. They are termed hard or soft according to the amount of glycerin contained in the mass from which they are made. Hard capsules consist of a shell and cap or cover. They are a fairly popular means of administering medicines in veterinary practice. They may be filled with powders by placing the powder upon a clean piece of paper and gently pressing the shell into the mixture when it will gradually fill. In order to get the exact amount in each capsule they should be weighed. This may be easily done by having the weight plus an empty capsule on one scale pan and throwing the filled capsule upon the other pan. If not sufficiently filled a little more pressure will bring the desired amount and if it is already over-filled a slight tapping upon the inverted capsule will throw out the excess. In case of very large capsules the powder may be poured directly into the capsule and cap. Liquids may also be poured into the shell of the larger capsules or dropped into the smaller ones by means of a pipette or burette. It is needless

to say that liquids which dissolve gelatin must not be placed in capsules unless they are to be given at once.

HAUSTUS.—DRENCH

A haustus or drench may be defined as an extemporaneous liquid preparation intended to be given immediately in one dose.

ELECTUARIUM.—ELECTUARY

Electuaries are medicinal pastes to be smeared on the teeth of animals where they melt at body temperature and are absorbed or are free to act locally upon the tissues of the mouth and throat. Usually a specified quantity is dispensed as a single dose or one of the common domestic measures may be used.

CHAPTER XII.

MATERIA MEDICA

The following lists contain the more important drugs arranged for convenience of study.

Students should keep a separate note-book ruled according to the following scheme, in which to tabulate the characteristics.

Explanatory:—The official name, synonym, dose, origin may be taken from some standard text but the form, color, taste, and odor should be taken directly from the specimen.

The dose should be given in both the Apothecaries and Metric systems.

Those preparations printed in *italics* should be studied so that they may be recognized by their physical characteristics, while the others should be sufficiently studied to know whether they may or may not be certain drugs. For instance, whether a brown powder might be calomel or nux vomica, or a colorless preparation tincture of digitalis, iron, etc.

Official Name Synonym Abbrev.	Dose H-Horse D-Dog	Origin Parts used	Active Principles	Appearance Form, Color Taste, Odor	Solubility	
					Ale.	Water

LESSON I

CIRCULATORY STIMULANTS

DIGITALIS GROUP

Digitalis	*D. N. T.	
Fluidextractum Digitalis	D. N. T.	
Tinctura Digitalis	C.	
Strophanthus	D. N. T.	
Tinctura Strophanthi	C.	
Scilla	C.	
Fluidextractum Scillae	D. N. T.	
Syrupus Scillae	H.	Ingredients

CIRCULATORY SEDATIVES

Aconitum	C.	
Fluidextractum Aconiti	D. N. T.	
Tinctura Aconiti	C.	
Veratrum Viride	D. N. T.	Very irritant to nasal
Fluidextractum Veratri Viridis		mucous membrane.

LESSON II

VASOCONSTRICTORS AND VASODILATORS

Adrenalin Solution	D. N. T.	Proprietary
Liquor Hypophysis	D. N. T.	
Amylis Nitris	D. N. T.	
Sodii Nitris	C.	
Spiritus Glycerylis Nitratis	D. N. T.	

ANTIPYRETICS

Cinchona	H.
Cinchona Rubra	H.
Tinctura Cinchonae	H.
Tinctura Cinchonae Composita	H.
Fluidextractum Cinchonae	H.
Quinina	C.
Quininae Sulphas	C.
“ Bisulphas	C.
“ Hydrochloridum	C.
“ Hydrobromidum	C.
Cinchonidinae Sulphas	C.

COAL TAR ANTIPYRETICS

Acetanilidum	C.
Antipyrina	C.
Acetphenetidinum	C.

* D. N. T. means do not taste; C, taste cautiously; H, harmless.

SALICYLATE ANTIPYRETICS

Acidum Salicylicum	C.	
Sodii Salicylas	C.	
Phenyl Salicylas	C.	
Acidum Acetylsalicylicum	C.	Proprietary
Methylis Salicylas	C.	

LESSON III

ATROPINE GROUP

Belladonnae Radix	C.
Belladonnae Folia	C.
Tinctura Belladonnae	C.
Fluidextractum Belladonnae	C.
Linimentum Belladonnae	C.
Atropinae Sulphas	D. N. T.
Hyoseyamus	D. N. T.
Fluidextractum Hyoseyami	C.
Tinctura Hyoseyami	C.
Hyoscina	D. N. T.
Stramonium	D. N. T.
Extractum Stramonii	D. N. T.

LESSON IV

CEREBRAL DEPRESSANTS

<i>Opium</i>	C.	
<i>Tinctura Opii</i>	C.	Per cent. of Morphine
<i>Tinctura Opii Camphoratae</i>	C.	Per cent. of Morphine
Extractum Opii	C.	
Pulv. Extractum Opii	C.	
Opii Deodoratum	C.	
Pulvis Ipecacuanhae et Opii	C.	Ingredients
Tinct. Ipecacuanhae et Opii	C.	
Morphina	D. N. T.	
Morphinae Sulphas	C.	
Morphinae Hydrochloridum	C.	
Codeina	C.	
Codeinae Sulphas	C.	
Diacetylmorphina	D. N. T.	
Cannabis	C.	
Fluidextractum Cannabis	C.	
Tinctura Cannabis	C.	
<i>Chloralum Hydratum</i>	C.	
Paraldehydum	C.	
Sulphonmenthanum	D. N. T.	

LESSON V

ANESTHETICS

<i>Chloroformum</i>	C.
Linimentum Chloroformi	D. N. T.
Spiritus Chloroformi	C.
<i>Æther</i>	C.
Ethylis Chloridum	D. N. T.
<i>Alcohol</i>	C.

BROMIDES

Potassii Bromidum	C.
Sodii “	C.
Lithii “	C.
Strontii “	C.
Ammonii “	C.
Acidum Hydrobromicum	D. N. T.

LESSON VI

STRYCHNINE GROUP

Nux Vomica	C.	Per cent. of strychnine
Fluidextractum Nucis Vomicae	C.	Per cent. of strychnine
Extractum Nucis Vomicae	C.	
Tinctura Nucis Vomicae	D. N. T.	
Strychnina	D. N. T.	
Strychninae Sulphas	D. N. T.	
Strychninae Hydrochloridum	D. N. T.	
Hydrastis	C.	
Tinctura Hydrastis	C.	
Glyceritum Hydrastis	C.	
Hydrastininae Hydrochloridum	D. N. T.	

PHYSOSTIGMINE GROUP

Physostigma	D. N. T.
Extractum Physostigmatis	D. N. T.
Tinctura Physostigmatis	C.
Physostigminae Salicylas	D. N. T.
Pilocarpus	D. N. T.
Fluidextractum Pilocarpi	D. N. T.
Pilocarpinae Hydrochloridum	D. N. T.
Nux Areca	C.
Arecolinae Hydrobromatum	D. N. T.

LOCAL ANESTHETICS

Coca	D. N. T.	Where grown?
Cocainae Hydrochloridum	D. N. T.	Mention other mem-
Alypinum	D. N. T.	bers of the group.
Novocain	D. N. T.	

LESSON VII

EMETICS

Apomorphinae Hydrochloridum	D. N. T.
Ipecacuanha	C.
Fluidextractum Ipecacuanhae	D. N. T.
Syrupus Ipecacuanhae	C.

BITTERS

<i>Gentiana</i>	H.	
Fluidextractum Gentianae	H.	Mention other bitters
Tinctura Gentianae	H.	
Quassia	H.	
Fluidextractum Quassiae	H.	

GASTRIC ANTACIDS

<i>Sodii Bicarbonas</i>	H.
Liquor Calcis	H.
Magnesii Oxidum	H.
Magnesii Carbonas	H.
Calcii Carbonas	H.

CARMINATIVES

<i>Capsicum</i>	C.	
Fluidextractum Capsici	C.	
Tinctura Capsici	C.	Mention other car-
<i>Zingiber</i>	C.	minatives
Fluidextractum Zingiberis	C.	
Tinctura Zingiberis	C.	

LESSON VIII

PURGATIVES

<i>Oleum Ricini</i>	H.	
Fluidextractum Cascarae Sagradae	H.	
Fluidextractum Cascarae Sagradae	H.	
Aromaticum		
<i>Aloe</i>	H.	
Tinctura Aloes	H.	
Aloinum	H.	
Tinctura Aloes et Myrrhae	H.	
Rheum	H.	Mention Preparations
Senna	C.	Preparations
<i>Oleum Tigllii</i>	D. N. T.	
Elaterinum	D. N. T.	
Cambogia	D. N. T.	
Jalapa	D. N. T.	

Oleoresina Jalapae	D. N. T.
Podophyllum	C.
Oleoresina Podophylli	D. N. T.
Colocynthis	D. N. T.
Extractum Colocynthis	D. N. T.
Scammoniae Radix	D. N. T.

SALINES

Magnesii Sulphas	C.
Sodii Sulphas	C.
Potassii et Sodii Tartras	H.

VERMICIDES

Aspidium	C.
Oleoresina Aspidii	D. N. T.
Granatum	C.
Kamala	C.
<i>Pepo</i>	H.
Santoninum	C.
Chenopodium	C.
Oleum Chenopodii	D. N. T.
Spigelia	C.
Fluidextractum Spigeliae	C.
<i>Thymol</i>	C.
Betanaphthol	C.

LESSON IX

DIURETICS

Digitalis Group		Recall characteristics
Caffeina		
Apocynum	C.	
Potassii Acetas	H.	
Potassii Citras	H.	
Potassii Bitartras	H.	
<i>Potassii Nitras</i>	H.	
<i>Spiritus Aetheris Nitrosi</i>	H.	

VOLATILE OILS

<i>Oleum Anisi</i>	C.	Flavors
" <i>Corinandri</i>	C.	
" <i>Lavandulae Florum</i>	C.	
" <i>Limonis Corticis</i>		
" <i>Menthae Piperitae</i>	C.	
" <i>Carui</i>	C.	Carminatives
" <i>Cinnamomi</i>	C.	
" <i>Eucalyptoli</i>	C.	
" <i>Foeniculi</i>	C.	
" <i>Pimentae</i>	D. N. T.	

Oleum Valerianae	D. N. T.	Malodorous
<i>Asafoetida</i>	C.	
Copaiba	D. N. T.	Genitro Urinary Stim-
Oleoresina Copaibae	C.	ulants
<i>Cubeba</i>	C.	
Oleoresina Cubebae	D. N. T.	
Oleum Santali	D. N. T.	
<i>Juniperum</i>	C.	Diuretics
Oleum Juniperi	C.	
Spiritus Juniperi	C.	
Buchu	C.	Preparations
Uva Ursi	C.	Preparations
Terebinthina	C.	Skin irritants
<i>Oleum Terebinthinae</i>	C.	
“ Lavandulae	D. N. T.	
“ Rosmarini	D. N. T.	
“ <i>Picis Liquidiae</i>	D. N. T.	
“ Cajaputi	D. N. T.	
<i>Sinapis Alba</i>	D. N. T.	
<i>Sinapis Nigra</i>	D. N. T.	
<i>Oleum Sinapis Volatile</i>	D. N. T.	Smell very cautiously
Thiosinimin	D. N. T.	
<i>Cantharis</i>	D. N. T.	
Tinctura Cantharidis	D. N. T.	
Eupatorium	D. N. T.	
Chrysarobinum	D. N. T.	
Epicarín	D. N. T.	
<i>Oleum Cadinum</i>	C.	
<i>Balsamum Peruvianum</i>	D. N. T.	

LESSON X

Terpini Hydras	C.	Used in respiratory
Terebenum		diseases
<i>Balsamum Tolutanum</i>	H.	
<i>Syrupus Tolutanus</i>	H.	
Oleum Savinae	D. N. T.	Toxic and Eebolic
“ Tanaceti	D. N. T.	
“ Rutae	D. N. T.	
“ Hedeomae	D. N. T.	
<i>Oleum Caryophylli</i>	C.	Used in Dentistry
“ <i>Cinnamomi</i>	C.	
“ <i>Sassafras</i>	C.	
“ <i>Gaultheriae</i>	C.	
Pyrethrum	D. N. T.	Insecticide

UTERINE STIMULANTS

<i>Ergota</i>	C.
Fluidextractum Ergotae	D. N. T.

UTERINE SEDATIVES

Viburnum Prunifolium	C.
Fluidextractum Viburni Prun.	C.

VEGETABLE ASTRINGENTS

<i>Acidum Tannicum</i>	C.	Preparations of these drugs
<i>Acidum Gallicum</i>	C.	
Galla	C.	
Kino	C.	
Krameria	C.	
Gambir	C.	
<i>Hamamelidis</i>	C.	

LESSON XI

SALTS OF POTASH

Potassii Bromidum	C.
“ Bitartras	H.
“ Citras	H.
“ Acetas	H.
“ Bichromas	D. N. T.
“ Nitras	H.
“ Hydroxidum	D. N. T.
“ Sulphas	H.
“ Bicarbonas	H.
“ Carbonas	C.
“ Chloras	C.
“ Iodidum	C.
“ <i>Permanganas</i>	D. N. T.
Potassa cum Calce	D. N. T.
Potassii Oleatum	D. N. T.

SODIUM SALTS

Sodii Hydroxidum	D. N. T.
“ Bicarbonas	H.
“ Carbonas	C.
“ Chloridum	H.
“ Sulphas	H.
“ Sulphis Phosphas	H.
“ Bisulphis	H.
“ Thiosulphas	H.

LESSON XII

AMMONIUM PREPARATIONS

<i>Aqua Ammoniae</i>	D. N. T.	Smell Cautiously
<i>Aqua Ammoniae Fortior</i>	D. N. T.	Smell Cautiously
Spiritus Ammoniae Aromaticus	C.	
Linimentum Ammoniae	D. N. T.	
<i>Ammonii Carbonas</i>	C.	
Ammonii Chloridum	C.	
Liquor Ammonii Acetatis	H.	

LITHIUM SALTS

Lithii Citras	H.	
“ Carbonas	H.	

CALCIUM SALTS

Creta Preparata	H.	Official preparation
Mistura Cretae	H.	Ingredients
Calcii Carbonas Praecipitatus	H.	
Calx	D. N. T.	
Liquor Calcis	H.	
Calcii Chloridum	C.	
Calcii Sulphas Exsiccatus	D. N. T.	Use?

BARIUM

Barii Chloridum	D. N. T.	
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MAGNESIUM

Magnesii Carbonas	H.	
“ Oxidum	H.	
“ Oxidum Ponderosum	H.	
“ Sulphas	H.	

LESSON XIII

ACIDS

<i>Acidum Hychloricum</i>	D. N. T.	Preparations
“ <i>Nitricum</i>	D. N. T.	
“ Nitrohydrochloricum	D. N. T.	Ingredients
“ Phosphoricum	D. N. T.	
“ <i>Sulphuricum</i>	D. N. T.	
“ Sulphuricum Aromaticum	D. N. T.	
“ Chromicum	D. N. T.	
“ <i>Aceticum</i>	D. N. T.	
“ Aceticum Glaciale	D. N. T.	
“ Stearicum	D. N. T.	
“ Oxalicum	D. N. T.	
“ Lacticum	D. N. T.	

"	Citricum	C.
"	Tartaricum	C.
"	<i>Oleicum</i>	D. N. T.
"	Boricum	C.
"	<i>Picricum</i>	D. N. T.

LESSON XIV

HALOGENS

<i>Iodum</i>	D. N. T.	
<i>Tinctura Iodi</i>	D. N. T.	
<i>Liquor Iodi Compositus</i>	D. N. T.	Ingredients
Unguentum Iodi	D. N. T.	
Iodopin	D. N. T.	
Sulphuris Iodidum	D. N. T.	
Sodii Iodidum	C.	
Potassii Iodidum	C.	
<i>Iodoformum</i>	D. N. T.	
Iodoformin	D. N. T.	
Iodolum	D. N. T.	
<i>Thymolis Iodidum</i>	D. N. T.	
Bromoformum	D. N. T.	See Bromides
Chlorum		
Calx Chlorinata	D. N. T.	

LESSON XV

SALTS OF HEAVY METALS

Arseni Trioxidum	D. N. T.	
Liquor Acidi Arsenosi	C.	Per cent. of Arsenic
Liquor Potassii Arsenitis	C.	Ingredients
Liquor Sodii Arsenatis	C.	
Liquor Arseni et Hydrargyri Iodidi	H.	Ingredients
Sodii Arsenas	D. N. T.	
Arseni Iodidum	D. N. T.	
Atoxyol	D. N. T.	
Sodii Cacodylas	D. N. T.	
Cupri Arsenas	D. N. T.	

ANTIMONY

Antimonii et Potassii Tartras	D. N. T.
Antimonii Sulphis	D. N. T.

BISMUTH

Bismuthi Subnitras	H.
" Subcarbonas	H.
" Subgallas	H.
" Subsaliicylas	H.

“ Betanaphtholas	H.
“ et Ammonii Citras	H.
Magma Bismuthi	H.

LESSON XVI

IRON

Ferrum	H.	
Ferrum Reductum	H.	
Ferri Carbonas Saccharatus	H.	
Massa Ferri Carbonatis	C.	
Ferri Chloridum	D. N. T.	
<i>Tinctura Ferri Chloridi</i>	C.	
Liquor Ferri Chloridi	D. N. T.	What is this used for?
Liquor Ferri et Ammonii Acetatis	C.	
Ferri Hydroxidum cum Magnesii Oxido	C.	For what used?
<i>Ferri Sulphas</i>	C.	
“ <i>Sulphas Exsiccatus</i>	H.	
“ <i>Subsulphas</i>	D. N. T.	Use?
Liquor Ferri Subsulphas	D. N. T.	

SCALE PREPARATIONS

.. Why so named?

Ferri et Ammonii Citras	C.
“ et Quininae Citras	C.
“ et Strychninae Citras	D. N. T.

COPPER AND ZINC

<i>Cupri Sulphas</i>	D. N. T.
Zinci Chloridum	D. N. T.
“ Acetas	C.
“ Carbonas Praecipitatus	D. N. T.
“ Oxidum	C.
“ <i>Sulphas</i>	C.

SILVER

Argentum Nitras	D. N. T.	
Argentum Nitras Fusus	D. N. T.	
Argentum Nitras Mitigatus	D. N. T.	Ingredients
Protargol	D. N. T.	
Argyrol	D. N. T.	
Argentamin	D. N. T.	
Argentum Solubile	D. N. T.	

LESSON XVII

LEAD

Plumbi Acetas	D. N. T.	
Liquor Plumbi Subacetatis	D. N. T.	Ingredients
Plumbi Iodidum	D. N. T.	
Plumbi Oxidum	D. N. T.	
Emplastrum Plumbi	D. N. T.	

MERCURY

	D. N. T.	
<i>Hydrargyrum</i>	D. N. T.	
Massa Hydrargyri	D. N. T.	
Unguentum Hydrargyri	D. N. T.	
Hydrargyrum cum Creta	D. N. T.	
Hydrargyri Chloridum Corrosivum	D. N. T.	
Hydrargyri Chloridum Mite	C.	
<i>Hydrargyri Iodidum Rubrum</i>	D. N. T.	
Hydrargyri Iodidum Flavum	D. N. T.	
Hydrargyri Nitras	D. N. T.	
Unguentum Hydr. Nit.	D. N. T.	
Hydrargyrum Ammoniatum	D. N. T.	
Hydrargyri Oxidum Flavum	D. N. T.	
Hydrargyri Oxidum Rubrum	D. N. T.	

MANGANESE

Mangani Dioxidum Praecipitatum	D. N. T.	
<i>Potassii Permanganas</i>	D. N. T.	

ALUMINUM

<i>Alumen</i>	H.	
Alumen Exsiccatum	C.	

CERIUM

Cerii Oxalas	H.	
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PHOSPHORUS

Phosphorus	D. N. T.	Do not remove from
Zinci Sulphidum	D. N. T.	bottle
Calcium Glycerophosphas	C.	

SULPHUR COMPOUNDS

<i>Sulphur Sublimatum</i>	H.	
Sulphur Lotum	H.	
Sulphur Praecipitatum	H.	
Sulphuris Iodidum	D. N. T.	

Calcii Sulphidum Crudum	C.
Potassii Sulphurata	D. N. T.
Ichthyol	D. N. T.
Ichthalbin	D. N. T.
Ichthoform	D. N. T.
Thiol	D. N. T.

LESSON XVIII

GERMICIDES

<i>Phenol</i>	D. N. T.	
<i>Phenol Liquefactum-</i>	D. N. T.	How made?
Unguentum Phenolis	D. N. T.	
Sodii Phenolsulphonas	C.	
<i>Creosotum</i>	D. N. T.	
Creosoti Carbonas	D. N. T.	
Guaiacol	D. N. T.	
Guaiacolis Carbonas	D. N. T.	
Pix Liquida	C.	
Cresol	D. N. T.	
<i>Liquor Cresolis Compositus</i>	D. N. T.	
Resorcinol	D. N. T.	
Naphthalinum	C.	
Beta Naphthol	C.	
Liquor Formaldehydum	D. N. T.	
Paraformaldehydum	D. N. T.	
Hexamethylenamina	C.	
Methyl Blue	D. N. T.	
Methylthioninae Chloridum	D. N. T.	
<i>Liquor Hydrogenii Dioxidi</i>	C.	

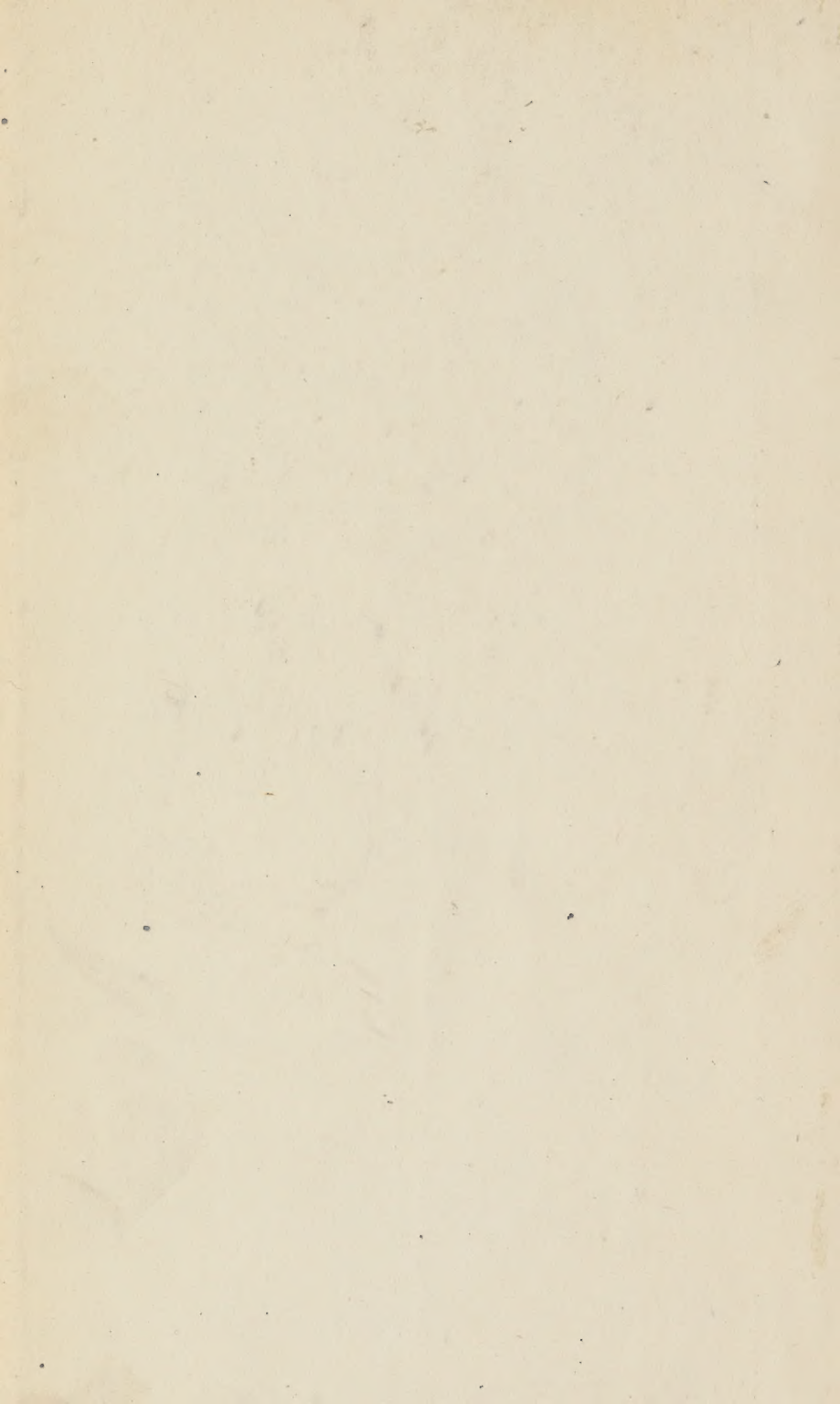
LESSON XIX

CAMPHOR GROUP

<i>Camphora</i>	C.	
Aqua Camphorae	H.	
Linimentum Camphorae	D. N. T.	Ingredients
Ceratum Camphorae	D. N. T.	Ingredients
<i>Spiritus Camphorae</i>	C.	
Linimentum Saponis	D. N. T.	Ingredients
Camphora Monobromata	C.	
<i>Menthol</i>	C.	

PROTECTIVES

Althaea	H.	
Amylum	H.	
Adeps	H.	
“ Benzoinatus	H.	
“ Lanae	D. N. T.	Preparation
<i>Oleum Lini</i>	H.	Raw or boiled and
Cetaceum	H.	Why?
<i>Petrolatum</i>	H.	
<i>Petrolatum Album</i>	H.	
<i>Petrolatum Liquidum</i>	H.	
<i>Glycerinum</i>	H.	
Cera Alba	H.	
Cera Flava	H.	
Talcum Purificatum	H.	
Kaolinum	H.	For what used?



S. G. L.

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